McGRAW-HILL DIGEST

ENGINEERING • INDUSTRY • SCIENCE • BUSINESS

JUNE 1948

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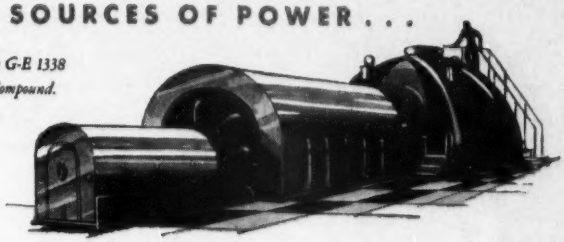

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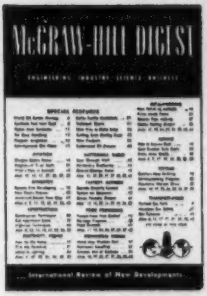

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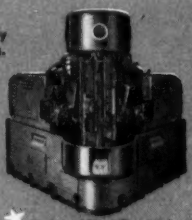

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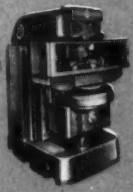

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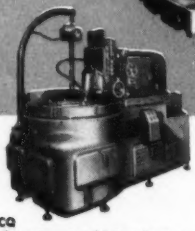

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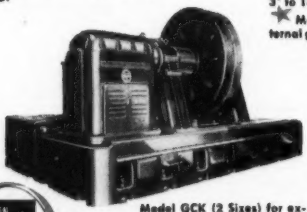

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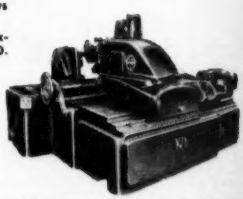

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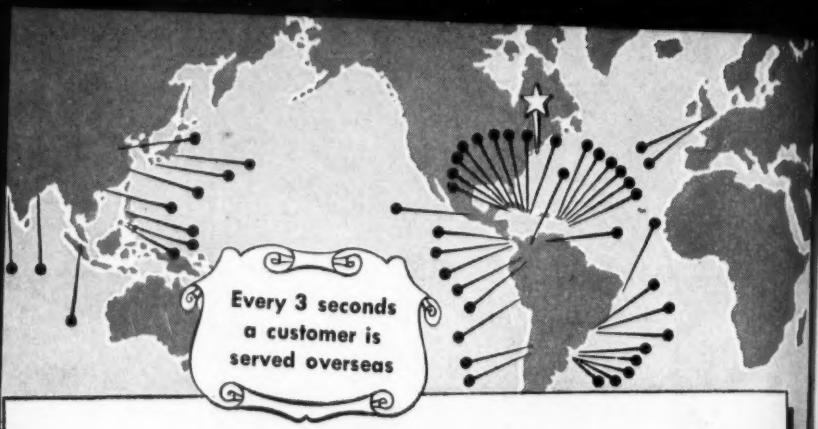

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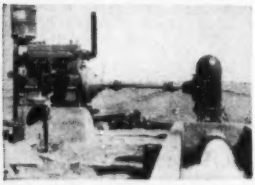

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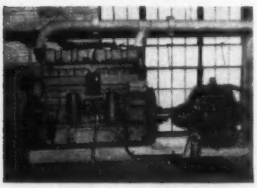

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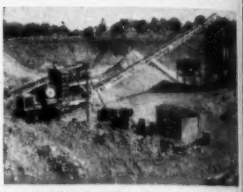

FURNISHING GRAVEL PIT POWER

DRIVING AIR COMPRESSORS (I-R)

HEAVY HAULING, LOGGING

HEAVY HAULING, MINING

PASSENGER BUS OPERATION

BUSINESS TRENDS

Private business will handle a large part of U. S. aid under the European Recovery Plan. This is significant news for producers and traders throughout Western Europe, Latin America, and Canada—all of whom will share in the program.

Virtually all procurement of machinery and equipment will be carried out through private channels. Business also will handle purchase of most raw materials, including large quantities that will be bought with U. S. dollars in Latin America and Canada—Chilean and Canadian copper, Venezuelan oil, Brazilian cotton. Only for such standardized foodstuffs as wheat, sugar, and meat are sales likely to be negotiated by government trade bodies.

Most commercial business under ERP will be on a reimbursable basis. Governments of countries receiving assistance will map out concrete programs, acting under the direction of the Committee for European Economic Cooperation.

These projects will be submitted to the U. S. Economic Cooperation Administration in Washington. Once approved, U. S. dollars will be placed in agent banks to cover the project as a whole. Payment for individual transactions can then be made from these dollar balances.

Here is the way a specific transaction might be carried out. Assume that Italy has had approved a program that calls for purchase of coal. The Italian government allocates 50,000 tons of coal to Ilva, Falck, Terni, and other Italian steel companies and gives them import licenses to buy such coal from the U. S.

The steel companies must then arrange for its purchase. Either they or their import agents contact representatives of U. S. coal producers and negotiate contracts. The steel companies pay for the coal in their own currency by obtaining, through Italian banks, dollar exchange set aside in the U. S.

Bulk purchases of farm products from Latin America and Canada are likely to be arranged in several ways. Countries receiving aid may undertake negotiations. Such may be the case if Britain requires wheat from Argentina. In many instances, U. S. government trade bodies will do the buying.

Look for another cutback in reparations from Western Germany. U. S. Congress, in framing ERP act, gave the administrator power in deciding what plants shall be moved from Germany. He can ask ERP countries to leave plants in Germany if it speeds up the program. If France, for instance, is entitled to a machine-tool plant and the ERP administrator finds removal would waste time or cost too much, he can tell France to give up its claim.

What does present U. S. rearmament mean to foreign industry? Directly, not too much, as the added $3-billion program will only take up the slack now beginning to show in spots, put some squeeze on materials, and give another drastic boost to inflation, especially on top of the $4.8-billion tax cut. Lend-lease or limited war might bring first serious industrial controls on U. S. business. That's when plans can be upset in both domestic and export fields.

Steel is beginning to feel the "war-boom" psychology. Companies that figure steel quotas will be cut as munitions output rises are bidding eagerly. Others have adopted a watchful-waiting attitude, sidestepping long-term commitments whenever possible. But steel mills are receiving inquiries that look like forerunners of military orders. When these inquiries turn into orders, look for pinch in plates and bars.

Non-ferrous metal markets can look for upward price changes. Tin prices are unsettled and are expected to stay so for another year. Only high-level diplomacy by U. S. has kept the tin cartel under control. Lead will probably get tighter with a 200,000-ton deficiency for the year; recent price boost will assure imports to U. S. Copper and zinc should hold present prices. Aluminum pig shortage may total 300,000,000 lb. or more, depending on aircraft production, but no price change is indicated. Increased Canadian aluminum shipments will help. Stockpiling alone will keep all metals in tight supply. Right now users are clamoring to get orders on producers' books.

Foreign engineers and investors are taking another look at India.

Original industrialization plans (it is known now) were far too optimistic and unintegrated. Restrictions on foreign capital were too rigorous, especially in view of the present uncertain economic, civil, and political situation. These same conditions exist today in other countries undergoing industrial evolutions.

But India now is modifying its plans—shelving some, postponing others—but present and active future projects are still ambitious and worthwhile. This all adds up to a realistic approach in switching from a practically agricultural economy to one that will be partially industrial.

Aid in capital goods and technical assistance from Great Britain and U. S. is likely to develop under certain conditions that would revive dwindling foreign interest. Important among them are granting of expanded roles in management and profit, and clarification on taxes, tariffs, and remittances.

To attract foreign capital, India plans to call in industrial technicians to push selected projects, and to make a more realistic selection of new projects.

Last year nearly 5,000 technical and professional workers were drawn to India by private companies; Britain here holds its traditional lead.

Expansion projects include fertilizer and steel production, port and airport facilities, and shipbuilding to reach goal of a 2-million ton merchant marine.

India has just launched its first ocean-going vessel and hopes to build five a year by 1950. Two new government-sponsored, 500,000-ton steel plants are planned to help fill India's desperate need for steel. Current demand is 2½-million long tons, as compared with total 1947 production of only 960,000 tons and imports of 20,000 tons.

Neither is private industry in India at a standstill. Among new projects is purchase by Mahindra & Mahindra, Ltd., of Venin-Severin Engine Co., Chicago, for removal to India after 12-18 mo. use in U. S. as a training school for Indian engineers.

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Electromagnetic Clutch

New clutch just announced uses iron particles suspended in oil to make contact between face plates. It has wide industrial application

INDUSTRIAL DESIGNERS look with interest to the new electromagnetic clutch recently developed and announced by the National Bureau of Standards. It operates on the principle that magnetic fields can control the frictional forces between solid surfaces and certain types of fluid media. Called the magnetic fluid clutch, it has obvious applications in the automotive field.

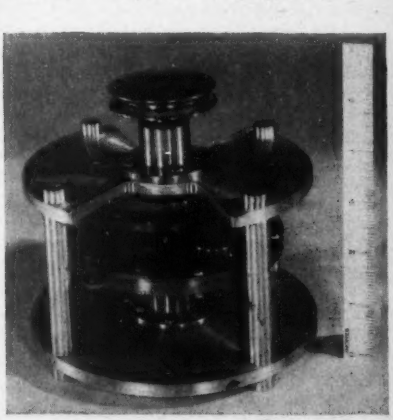
Other application possibilities lie in automatic control of machinery where ease of control and low to high speed stability are important, in brake design, telephones, and airplanes.

Clutch is made of three component parts: driving shaft with a plate at its end, a driven shaft and plate, and literally millions of fine iron particles suspended in oil—packed between the inner surfaces of the two plates. These iron particles are the only connection between inner surfaces of the two plates; the oil is the only connection between driving and driven elements.

Applied to clutch operation, the principle works as follows. Space between the two parallel magnetic plates is filled with the fine iron particles. When a magnetic field is established between the plates, particles form chains that bind the plates together.

The clutch operates without chatter, similar to a dry-friction unit. Locking force is practically constant; it never grabs, regardless of the speed of the plates. Wear is practically non-existent because working surfaces are so well lubricated.—Business Wk, Ap 10, 72

PRINCIPLE: Magnetized iron suspended in oil adheres to magnet



RESULT: Using the principle (left), this test model clutch was developed

Radioactivity in Industry

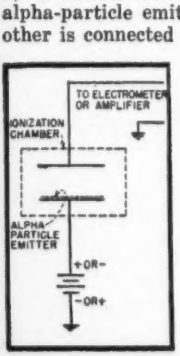
The representative devices shown here are forerunners of the many industrial applications that will develop as the science progresses

QUANTITY PRODUCTION of radioisotopes as a byproduct of the uranium pile has stimulated development of new industrial applications of radioactivity. Radioactive materials now are available abundantly at reasonable cost, and safe handling techniques (See McG-H Digest, May, 48, p. 22) have been established.

Prewar uses of radium—in radiographic cylinders, as neutron sources (radium-beryllium), in luminous compounds, for dials, as static eliminators—now become economically attractive.

More recent applications of radioactivity in industry may be divided into four groups: (1) Those utilizing the ionization power of the radiation; (2) those utilizing penetrating properties; (3) devices in which motions or displacements are detected by radioactive substances coupled by some means to these movements; and (4) applications based on easily recognizable radiation and their detection methods, such as tracer.

Radioactive resistors utilize the ability of alpha- or beta-particle emitters to ionize air, making it conducting. One electrode of ionization chamber (Fig. 1) of such a resistor is covered with an alpha-particle emitter, as polonium, and other is connected to an electrometer.



1 RADIOACTIVE resistor has an ionization chamber with one electrode covered with a radioactive material that emits alpha particles and the other electrode connected to electrometer or amplifier. Increasing electrode voltage increases ionization current. Such resistors show complete absence of polarization and temperature deficiencies.

As electrode voltage increases, the ionization current increases until saturation is reached. Radioactive resistors built on this principle have been used as leakage resistors of electrometers in radioactive laboratories and are equally useful in electronic circuits requiring high grid resistance. They also can be applied to measurement of high voltages, especially where only a small current can be drawn from one source.

Applications using penetrating properties include a scanning device (Fig. 2) for testing homogeneity and thickness of thin films during production by using beta radiation from Ra B and Ra C plaques. The beta radiation penetrating a standard film is compared to that passing through the test sample. Emergent radiation is measured directly by ionization effect in two chambers or indirectly by phototubes responding to the light effect produced on fluorescent compounds.

Another device applying this principle is the radioactive integrator (Fig. 3) that measures irregular areas. A polonium-covered plate is positioned far enough below a wire mesh grid so only the most perpendicular alpha radiation can ionize the space between grid and top electrode.

When a plane surface is placed on the grid, the ionization current is reduced by an amount proportional to the unknown area. The polonium resistor keeps the plate current of tube constant for equal surfaces despite polonium decay.

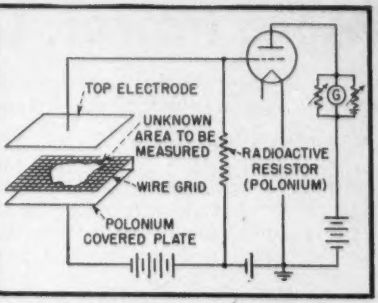
Such arrangements are useful for (1) measuring porosity and open areas of mesh surfaces, (2) integrating values of curves or charts cut out along their peripheries, (3) determining most effective layouts of patterns to be cut from metal or fabric, and (4) measuring areas of precious metals, furs, and leathers.

The absorption coefficient of alpha particles is applied in the liquid-level indicator in Fig. 4 *(A)*. As long as the alpha-particle source is in gaseous atmosphere, an ionization current is maintained. When the liquid level rises or the ionization chamber is lowered so a slight layer of liquid (less than 1 mm. thick) covers the radioactive foil, the ionization current ceases and plate current of an associated amplifier tube is reduced.

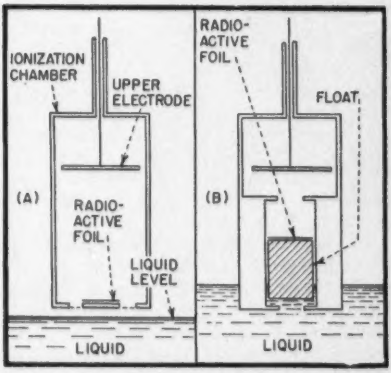
Another such indicator in Fig. 4 *(B)* has the radioactive foil on a float. As the float rises, the foil approaches the electrode and current increases. The current can be made to actuate a relay and motor control circuit when a fully automatic apparatus is needed.

Motion can be indicated when a radioactive material is coupled to the moving part, as variations in position cause changes in ionization current or light effect. A typical use is the radioactive galvanometer in which a vane, plated with radioactive material, is attached to the moving system in place of a mirror.

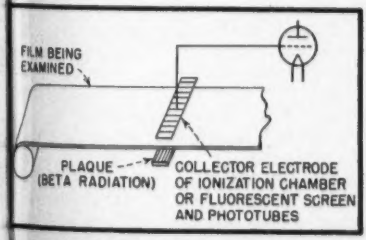
Leveling or determining degree of inclination is also possible by a radioactive device. Any deviation from horizontal position of the beam (Fig. 5) increases the current in one phototube and at the same time decreases it in the other. If phototube currents are in a bridge circuit, the instrument can be made quite sensitive and adapted for automatic reveling.—Electronics, Ap, 78



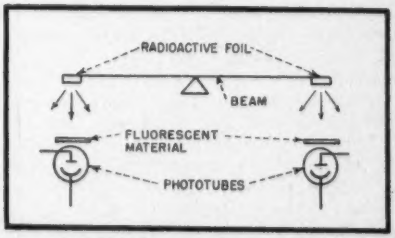
3 RADIOACTIVE INTEGRATOR measures area of irregular pieces by indicating the reduction in ionization current



4 LIQUID-LEVEL indicators show rising liquid heights by decreasing particle emission in (A) and by increasing current (B)


FILM BEING EXAMINED
PLAQUE (BETA RADIATION)
COLLECTOR ELECTRODE OF IONIZATION CHAMBER OR FLUORESCENT SCREEN AND PHOTOTUBES

RADIOACTIVE thickness gage for moving sheets has radiation plaque beneath the sheet and collector electrode above



5 RADIOACTIVE LEVELING method indicates deviation from horizontal by changes in phototube currents

More Power, Less Steam

Expansion of refinery power plant meets demand for greater power and le process steam by use of topping turbines and new dual-circulation boile

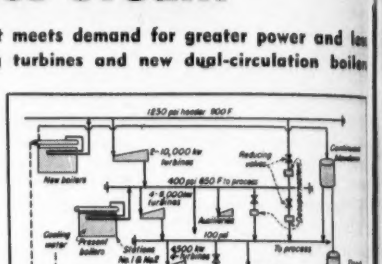
INCREASED DEMAND for electrical energy, paired with a much slower increase in steam requirements, turned Standard Oil of Whiting, Ind., refinery to use of topping units to exhaust into an existing 400-psi. level. Advantage is that a topping cycle gives additional power with no increase in steam production and only a small increase in fuel consumption to meet the higher steam pressure.

First step in plant design was selection of topping pressure levels to keep difference between initial and exhaust pressures of the topping turbine as great as possible. Existing boilers set exhaust conditions at 400 psi., 650° F. Performance data for suitable topping turbines indicated a selection of throttle conditions from 900 psi., 825° F. to 1,850 psi., 1000° F. Power demand and economic advantage pointed to 1,250 psi., 900° F. as the best choice.

Dual-circulation boilers were designed for pulverized-coal, oil or gas firing. While resembling a conventional 3-drum boiler, the unit has two separate heat-absorbing sections, each with its own independent circulation system. One section, the primary or high-duty one, comprises the radiant-heat-absorbing furnace. The low-duty section consists of convection surface.

All feedwater enters the primary section, and all steam is delivered from it. Continuous blowdown feeds the secondary, and steam produced in the secondary is condensed in the primary. Total blowdown leaves from secondary.

This dual-circulation design reduces blowdown rate and resulting heat loss. It also lessens likelihood of tube failures by keeping concentration low in areas of high heat absorption and results in minimum production of silica vapor and subsequent silica deposits in equipment.



FLOW DIAGRAM shows arrangement of major equipment in new plant and its relation to existing capacity and loads. Heat of expansion program is new dual-circulation boilers fired by coal, oil, or gas.

At 18% blowdown, the secondary section shows boiler-water concentration as 1,000 parts per million, silica content 61 ppm. The primary section, from which steam is supplied to the main, shows boiler-water concentration as 352 ppm, silica content 2.36 ppm., total solids carryover 0.35 and silica in steam 0.02 ppm. Feedwater had total soluble solids of 150 ppm. and 1 ppm. silica.

Inequalities in demands for steam and power are taken care of by steam-conditioning equipment that reduces steam from initial pressure and temperature conditions of the topping cycle to turbine-exhaust level. For normal operation, two pressure-reducing and desuper-heating stations accomplish this conditioning.

Each station consists of a pilot-type reducing valve and a steam-jet water spray nozzle desuperheater. Spray water comes from condensing vapor, from the deaerating heater, in vent condensers.

As feedwater makeup approaches 100%, water treatment is extremely important. Raw water presettles in two 50x50-ft. storage tanks. It passes through vent condensers on the deaerating heaters to spray heaters on the sedimentation tanks. Water temperature rises from 180 to 240° F,, corresponding to a 10-psi. exhaust-steam pressure. Steam for heating in treating tanks comes from refinery exhaust mains and from continuous-blowdown flash drums.

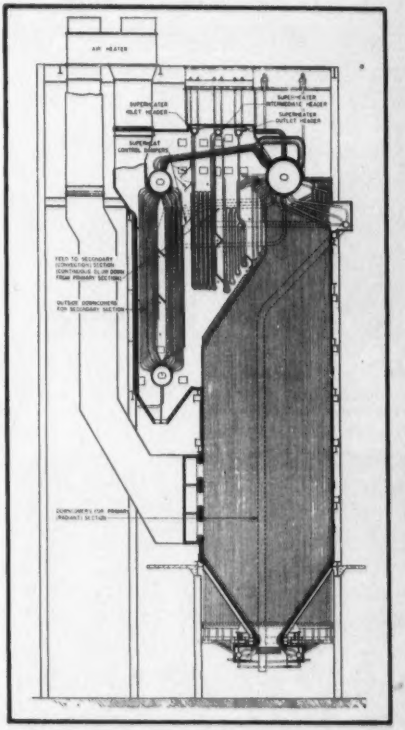
Sedimentation tanks are lime-soda and phosphate units, each pair having a net capacity of 80,000 gph. Retention time runs 1½ hr. From the phosphate sedimentation tanks, the water passes through conventional pressure filters, using anthracite as the filtering medium, to the treated-water storage and deaerator storage. To accelerate precipitation, each sedimentation tank can recirculate sludge from the 70° sludge cone back to the top of the tank. Automatic sludge blowdown valves withdraw sludge precipitated in cone, while quick-opening valves allow intermittent desludging.

In the steam cycle of the flow diagram, two 10,000-kw. turbine generators receive the output of the new boilers at 1,250 psi., 900° F., at the throttle. Under full load, the topping turbines exhaust at about 650° F to a 400-psi. process header. Existing 400-psi. boilers also supply this header.

Non-condensing turbine-generators, already operating at this pressure level, reduce steam to 100 psi. This steam goes to the refinery for power, process, and heating, being transported to points over 4,000 ft. from the station. Accidental overloading of generators could develop from rupture of a distribution main or loss of one or more 400-psi. boilers, which would drop the exhaust pressure on topping turbines.

Overload devices that control steam inlet valves guard against such danger. For any backpressure established, a limit regulator passes sufficient steam to develop 125% load or less. These controls permit a limited steam flow for electrical and steam loads during emergency periods. They respond to a backpressure approximately 25 psi. below normal range to close turbine-inlet valves until backpressure stabilizes.

Under normal conditions, the 400-psi. turbines and the new topping ones have a manual governor control. This distributes load between turbines and maintains system speed.—Power, Mr, 84; Ap, 100

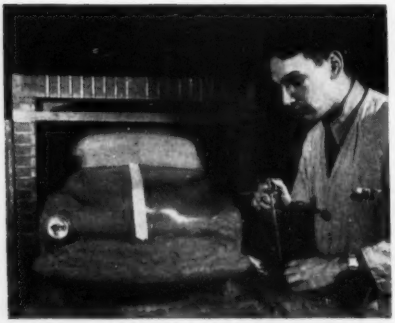

AIR HEATER
SUPERHEATER INLET HEADER
SUPERHEATER INTERMEDIATE HEADER
SUPERHEATER OUTLET HEADER
SUPERHEAT CONTROL DAMPERS
FEED TO SECONDARY ECONOMIZER SECTION CONTROLLED FLOW FROM PRIMARY SECTION
OUTLET CONNECTIONS FOR SECONDARY SECTION
OUTLET CONNECTIONS FOR PRIMARY SECTION

DUAL-CIRCULATION BOILER delivers 300,000 lb. of steam per hr. at 1250 psi. and 900° F. with essentially 100% makeup. Advantages include minimum blowdown, operation at low concentrations, and low silica carryover and deposit in equipment.

Design Board

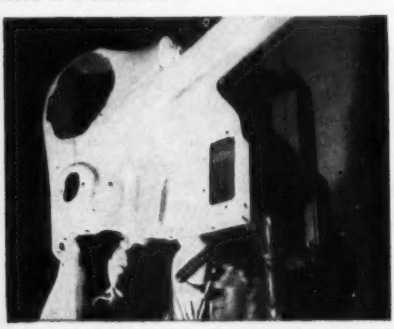
Automobiles are improved in three major ways; minor changes, annual model changes, and the twice-in-a-generation complete reengineering. The 1949 Mercury, made by Ford Motor Co., has

1 PENCIL SKETCHES in small scale by dozens of draftsmen were turned out before top management picked final body designs. This is the first step in the job.

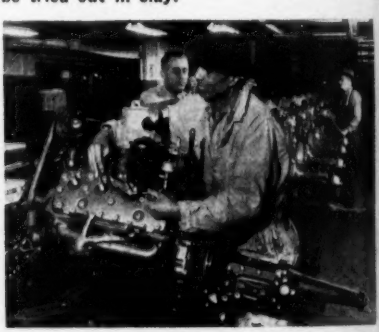


3 CLAY MODELS, ¼-scale, are made over wooden forms or body bucks—drawing used as a guide. Accurate to 1/32 in., model is being checked for fender height. Strip on hood is a metal rule.

4 PLASTER MODEL molds are placed inside a bathtub-like vat, then plaster and wire reinforcing are worked into shape. Models are made in sections so body parts can be tried out in clay.



7 HAMMERED METAL, formed over the wooden models, is shaped into sub-assemblies. Engineer is checking to see if mass-production techniques are possible.



8 SINGLE 1949 MERCURY engine moves down the "dress-up" line. Engines to the rear are '48's. Engine changes: distributor atop engine, new manifold and carburetor.

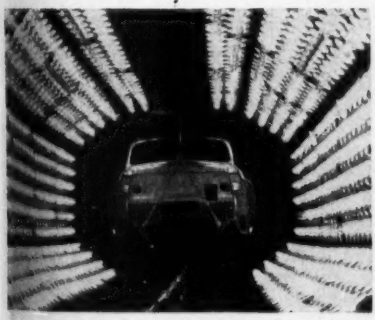
To Driveway

just undergone a twice-in-a-generation reengineering job. In pictures, this job is shown. The redesign began in October 1946 following months of preliminary work.—Science Ill., May, 46

2 FULL-SCALE drawing in color, complete even to name plate, is made after final design has been selected. All four views are drawn to give a complete picture.

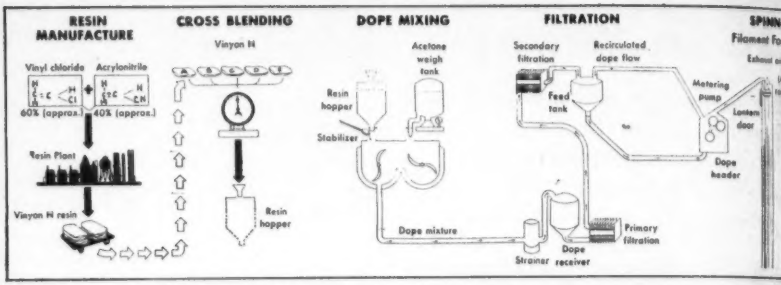
5 ACTUAL SIZE car model is prepared. Clay is formed onto a body buck. Clay is kept in electric ovens at 160-180° F. until used; hardens when cool. Template is checking fender curve.

6 FRONT FENDER is next made of polished mahogany in full scale. This will be used as a hammer mold. On it fenders for the first hand-built car will be fashioned. One model will eventually cost $50,000.



9 CONVERTIBLE BODY enters a 300° F. infrared drying tunnel. Body gets three coats of paint, sprayed on in 3 min. Final assembly varies little from standard.

10 1949 MERCURY SEDAN. Hand-made model is evidence of a $50,000,000 program. Car has been thoroughly tested—over bad terrain and in bad weather.



VINYON N PROCESS—Carbide & Carbon Chemicals Corp. is producing seven types of Vinyon N fibers in this ten-step pilot plant operation. Flow sheet shows the points at which each type is taken off for packaging and shipping. The seven types and their basic characteristics are: NEXX: resilient, water and fire resistant; is moldable. NEZZ: high

VENTILATION ON THE FARM IMPROVES PRODUCTION

With 68% of occupied farms in U. S. equipped with electricity, ventilation can increase production, save time, build profits. Starting in the farm house and working through the hay mow, storage rooms, barns, and poultry houses, fans and ventilating equipment aid in getting the most out of each operation.

Ventilation of hay mows gives better hay and eliminates losses due to adverse weather conditions. A new application of this same principle dries high-moisture-content corn.

Cost of electricity ranges from 75¢ to $1.50 per ton of hay dried and total cost of installation averages 25¢ per sq. ft. of mow area. This includes the motor which can be used for other power jobs on the farm.

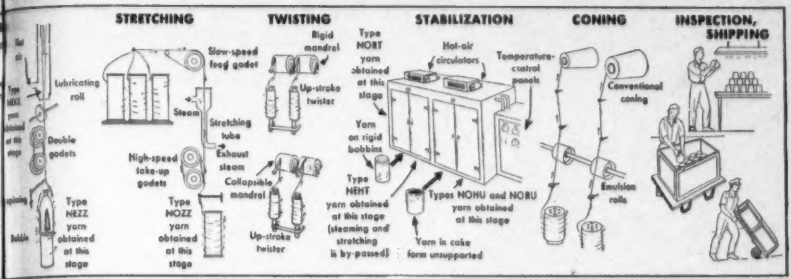
Barn ventilation not only increases the milk flow of cows between 10 and 200 lb. per cow a month but also increases profits by keeping buildings dry. This prevents rot and peeling paint and also removes ammonia fumes and excess humidity which makes barns unhealthful. Milk-shed installations remove odors which might contaminate milk.

Ventilated poultry houses insure healthier birds and better eggs. Cleaning time is also saved. Litters which normally need cleaning every 10 days can be let go for months. An increase of as many as 200 more birds can be housed in the same space when ventilating systems are used. The task of cleaning eggs is also lightened by a new machine which washes the eggs between cloth disks and immediately dries them by a fan-forced blast of warm air. Fans and ventilating systems can also be applied in brooders, incubators, and feed rooms to prevent souring of wet feed.—Elec Whols, Mr, 81

TRUES WHEELS ON R. R. CARS

Wheels of locomotives and cars will be reconditioned on the car with the new milling machine under development by Standard Railway Equipment Mfg. Co. Using rotary cutters with cemented carbide teeth, the machine will recondition wheels in 20 min. Current model handles one wheel at a time, but another model will do all four wheels per truck at the same time.

Car is moved over pit and cutter is adjusted—once set, it remains the fixed distance from the axel. Cutters pare off excess metal and true tread and flange in the same operation.—Business Wk, Ap 10, 70



extensibility, 99% elongation. NEHT: stiff, resilient, and crush resistant; 9% elongation. NOZZ: controlled shrinkage, low elongation, elastic, and high wet strength. NOHO: silk-like, quick drying; can be formed. NORU: high impact properties; chemical, heat resistant. NORT: long elongation, strong, chemical resistant.—Textile World, Ap, 116

GAGES THICKNESS OF MOVING SHEETS

Glass and other nonmagnetic sheets, ranging in thickness from ¼ to 1 in., can be continuously gaged to close tolerances. The material is run between the primary and secondary of a measuring transformer.

Two sets of heads, comprising primary and secondary windings, receive material to be gaged in one set and a standard-thickness flat in the other. They are balanced in a bridge arrangement. Any change in spacing in measuring head causes unbalance in transformer input resulting in a secondary voltage.

As long as work remains one thickness, measuring-head and standard-head voltages balance. When work goes undersize or oversize, predominating voltage results in corresponding signal on the indicating meter.—Electronics, May, 90

DUAL-DUTY LOCOMOTIVE

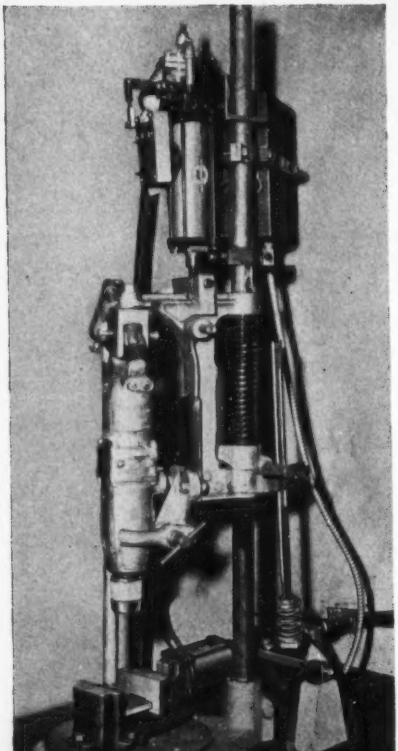
New dual-duty locomotives at work at Consolidation Coal Co. are cable-reel units with motors permanently connected in parallel, providing one range of speeds for 11-ton mine cars and a higher range for travelling with trolley power. On cable reel, speeds are creep to 5.6 mph.; trolley speeds are creep to 7.8 mph. Locomotives are 4-wheeled, 2-motor units with two 250-volt dc. motors hung inside axles.

To gain higher speeds for trolley operation, some current is shunted from the series fields by appropriate resistance of low ohmic value. Controller is of single-handle type. As handle is moved to fifth notch, cam-operated main switches cut out accelerating resistance in steps. At fifth notch, motors are across the line. With power through trolley, handle can be advanced to notches 6 and 7, weakening fields by connecting shunts across them.—Coal Age, Ap, 96

SPOILERS HELP CONTROL

The Landgraf H-2 helicopter will be the first 'copter to use ailerons as well as spoilers on rotor blades. Spoilers effect yaw control while hovering; ailerons gain cyclic direction control in flight.

Spoilers—tapering 1¾ in. at blade-root end to 1 in. toward blade tip—are operated by foot pedals via cables, and raise or lower rotary following plates in rotor hubs. A centrifugal balance closes device when opening force is released. —Aviation Wk, Mr 29, 24



FASTER WORK HANDLING—Output of existing equipment can be stepped up 200-600% by substituting power for manual feeds in drilling, tapping, nut running. A valve manufacturer switched to air feeds with this arrangement. Vise opens and closes automatically according to vertical movement of the continuously cycled nut-runner. The assembled valve falls into a chute, requiring operator only to load. The automatic timer, located high behind the column, overcomes the effect of threads of variable length by allowing for the maximum length of thread. Upper air motor applies driving force to nut runner, while lower one operates vise.—Am Mach, Mr 25, 88

GAS-TURBINE CYCLE IN COAL-GAS PROCESS

A new continuous process for converting coal to gas incorporates a gas-turbine cycle. A solid, such as bituminous coal in a finely pulverized state, is injected into a 150-psi. gasification unit with oxygen and steam. In the combustion zone, combustible elements of the fuel react with oxygen to form a gas, predominantly CO and H_2.

In the quench zone, a liquid fuel is injected into the gas stream where the vaporized liquid fuel will be cracked. The gases then pass through a dust separator, then into the gas turbine. Here, gases expand and pass on through a waste heat boiler and a water cooler in which liquid fractions are condensed.

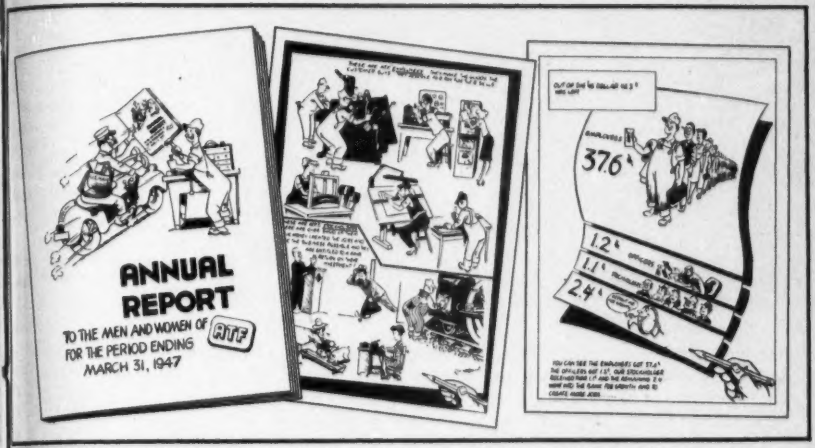
The liquid is separated from gas in a liquid-gas separator. Each may then be further processed: purification of gas and fractionation of liquid into an aromatic distillate and a residual fuel oil.

The gas-turbine cycle generates the power required for air and oxygen compressors of the oxygen unit, and also may generate byproduct power. Thus utilized is the energy which the gas possesses because of its high temperature and pressure.—Chem Eng, Ap, 108

SURVEY SETS BUS ROUTES

Before the shift to motor buses from street cars was made, C N & C Railway Co. surveyed its riders to see how riding habits would be changed. Answers were recorded on keysort cards for ease in tabulation. Bus routes were established on known ride characteristics.

Other factors determined by the survey were: total and maximum loads by time for scheduling; average potential loads after conversion as computed from number of passengers whose ride habits would be changed; material for equipment size studies; average ride length for express and turn-back operations.—Bus Trans, Ap, 66



ATF ANNUAL REPORTS are well read by employees. This is one way to . . .

Keep Your Workers Informed

Management is keenly aware that good relations with employees depend on keeping them posted with all facts on the company's entire operation

GREATER NEED exists today than ever before for management to keep its workers informed on what it is doing. Suspicion and distrust breed on lack of information and on misinformation. So old-time secrecy is giving way to frank dealings.

If management wants cooperation from employees, it is time to speak up and take them into its confidence. Employees cannot know what is right until they have all the facts, unbiased and free from propaganda, either political or union-wise.

Alert management has access to many lines of communication with its people: information manuals, plant newspapers and magazines, direct mail, factory bulletin boards, pay-envelope inserts, plant public address systems, mass meetings, open houses, annual reports, and not least of all the supervisors.

A survey made of 1,140 companies by the National Industrial Conference Board showed that bulletin-board use topped all means at 84.6%, supervisors' meetings next at 83.8%, posters 71%, supervisory letters 63.6%, employee letters 54%, handbooks 53.2%, and magazines 43.6%.

A trend in the manual, or handbook, is to discard the harsh technique of "dos" and "don'ts" in favor of a friendly, informal approach. Advantages of working for the company and mutual stake in its success are stressed. Excellent examples are: "Life at Frigidaire," "Partners in Revere," "Your Life in Blackhawk-Town" (Blackhawk Mfg. Co.), and "About You . . . And Us" (Munsingwear, Inc.).

The practice of publishing an annual report of company operation for employees is growing. No publication issued by management is more important. Workers want to know what profits are

GOODBYE RICKSHAWS—A three-wheeled, gasoline-powered vehicle, the Rik-Mobile, has been designed to supplant rickshaws in Far East. On triangular steel frame, it has motorcycle type handlebar steering mechanism. Speed is 35 mph.; gas consumption is 70 mi. per gal. It will be produced by China Engineering Products Corp. —Am Mach, Ap 8, 132

and whether they are getting a fair share. A humanized report, dressed up with pictures and drawings, pays for itself many times over.

Allegheny Ludlum Steel Corp. published in 1947 an 8-page report for employees and neighbors in its four plant cities. Stressed were community facts regarding the company, its high wages of 16¢ per hr. more than average in the steel industry, and its profits in easy-to-understand terms.

Supervisors Take Part

Most managements realize the part supervisors can take in keeping employees well informed. International Harvester Co. takes full advantage by keeping them posted by weekly management letters, special bulletins on "hot" news, and the regular letters mailed to all employees. Every foreman is urged to read all letters or bulletins not marked confidential to his men or tell the news personally to each man.

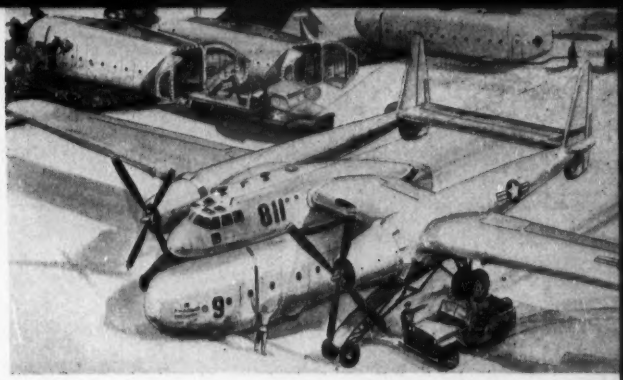
Employee letters mailed to their homes are successful if they are short, not sent too often, and are devoid of preaching. Subject matter can be widely diversified. Pitney-Bowes Postage Meter Co. devoted one letter to an explanation of a new stock issue; Caterpillar Tractor Co. sent a series of letters on the Taft-Hartley law.

Plant newspapers and community daily newspapers are favorite places to tell management's story. General Motors aims one plant paper at salaried employees. A survey showed over 90% of white-collar workers wanted more information about the company and its policies.

Mass meetings are effective. One U. S. manufacturer with 14,000 employees tells his story periodically in a series of sessions with 2,500 workers at each meeting. Six or seven sessions add up to a grueling schedule, but company officials think it worth the effort.

Payroll envelope inserts are favorites too, but are no good for "sermons" or campaigning; facts only count here. For more impressive means of showing off good working conditions and enlightened management practices, open houses are once again becoming popular.

Of the two approaches to employee communications, mouse-like or bold, General Electric Co. picks the second. Since last October, it has been giving its workers facts to convince them that they should forego a third round of postwar wage increases. Class war, the Taft-Hartley act, high cost of food and housing, size of G. E. profits, and adequacy of wages—all have been treated in bulletins and picture-story pamphlets to win the good will of its workers and to show them where their long-term advantages lie.—Am Mach, Mr 25, 99



Fairchild's projected C-120 "Pack Plane." Engines are Pratt & Whitney R-4360's, developing 3,250 hp. each

PACK PLANE DESIGNED

Using the basic C-119 frame, Fairchild Engine & Airplane Co. is constructing an experimental C-120 *Pack Plane.* It will carry a streamlined cargo compartment, holding 2,900 cu. ft. or 9 tons of cargo, suspended below fuselage. The cargo compartment prohibits use of a nose wheel; a quadricycle gear, retracting into engine nacelles, has been designed.

To permit pilot-vision over the pack, crew nacelle rotates about the plane's horizontal reference line, bringing pilot's line of sight closer to the front. Pack can be mounted on a truck or freight car for delivery to destination after arrival at airport.—Aviation Wk, Mr 29, 11

LARGER TELEVISION TUBES

Glass-metal vacuum seals of large diameter and automatic cathode-ray tube assembly machinery developed at Radio Corp. of America may make possible economic production of a 16-in. metal-wall kinescope having a 125-sq. in. picture area. Cost within a few years should be comparable to the current price of 10-in. tubes.

Using metal for the flare has three chief advantages over glass: the envelope is considerably lighter for the same strength, is conducting (without needing an Aquadag coating), and provides magnetic shielding. For television receiver designers, the tube will offer a new technique for providing a screen size between the popular 10-in. directly viewed and the larger projected picture. —Electronics, Ap, 186

SOLVENT RECOVERY COSTS

Over-all efficiency of solvent recovery by activated carbon depends on efficiency of the vapor collecting system and that of the adsorbers themselves. The first is governed by exhaust-system design and may be as high as 90%, while efficiency of a carbon bed runs 95-99%.

Except for the value of the recovered solvent, direct operating costs determine economic feasibility of activated carbon recover. Labor costs are low. Steam consumption varies from 3-5 lb. per lb. of solvent recovered, power from 0.05-0.15 kwh. per lb., and water from 5-10 gal. per lb.

Performance guarantee on a recent installation in England was: 95% recovery efficiency; actual recovery, 213 U. S. gal. of benzene per hr.; steam, 3.5 lb. per lb. of benzene; power, 0.06 kwh. per lb.; and water, 7 gal. per lb.

Recovery applications are wide: benzol, carbon disulphide, trichlorethylene, ketones, benzene, naphtha, alcohols, acetones, xylene, toluene, acetates, hydrocarbons, and varnish solvents. Industries include rubber, synthetic fiber, printing, paper, and gas.—Chem Eng, Mr, 112

Welder Stores Kinetic Energy

New system of dc. supply for spot, projection, or flash welding features integral flywheel in generator to store kinetic energy for later release

LIMITATIONS of existing resistance-welding equipment to smooth out demand power loads led to development of a generator to operate on the principle of kinetic-energy storage. Based on the design of the acyclic or homopolar machine, which is the oldest generator of continuous dc., the welding power supply incorporates a compensated homopolar generator, induction motor, flywheel, and carbon-pile contactor.

The new generator is actually two generators back-to-back. Their rotors are joined axially, and their armature conductors are joined directly in series so induced voltages are additive and each unit needs develop only half the required machine voltage.

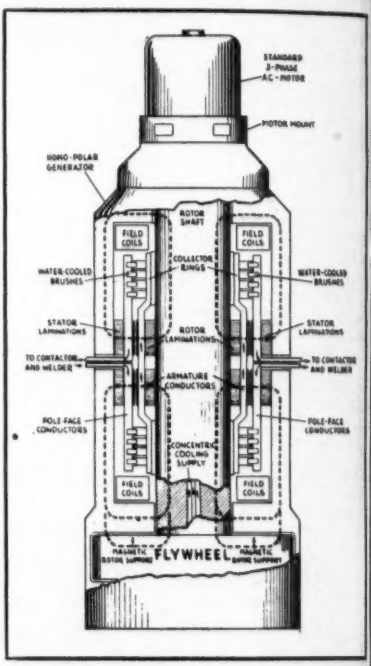
The dotted lines show the field-flux linkage paths through each half of the unit. The direction of flux is opposite in the two ends of the rotor so there is no tendency for interaction between the two magnetic circuits and polarities of induced voltages make them additive.

As a homopolar generator has poor voltage regulation under load because of armature reaction, the new generator is compensated by bringing brush leads out through pole-face conductors through the stator laminations. Thus the tendency of the current in the armature bars to rotate, distort, or collapse the field flux is substantially cancelled by opposing action of current in stator poleface bars.

The entire rotating system is carried on two double-row ball bearings; one below the flywheel in which kinetic energy is stored and the other below the motor mount ring. To lessen thrust load on the bottom bearing, part of the field flux is allowed to leak into the flywheel, thence to the rotor, producing a lifting force that balances the rotor weight.

Oscillographs show that welding currents remain quite close to a uniform value during the welding interval, although voltage declines because of slowing of the flywheel. The pilot generator can supply more than 50,000 amps. at a terminal voltage under load of 5.5 v., open-circuit voltage being about 7 v.

Reports to date indicate that the system offers a practical method for spot, multiple-spot, projection, or flash welding.—Weld Eng, Ap, 36



Kinetic-energy storage in welding generator is based on built-in flywheel connected to rotor shaft and flux-linked to bottom unit

NEW USES FOR PLASTICS

Extruded plastic "lay-flat" baby bottles will soon be available. Extruded polyethylene tubing sold in continuous lengths and heat-sealed at 6-in. intervals will have sterile interiors until cut. The user cuts tubing at one end, fills it with sterile milk, and inserts a plastic fitting with nipple over the open end. The bottle is discarded after one use.

Four years of research have resulted in a plastic miniature battery. Designed for small radios, hearing aids, and cameras, the new batteries will soon be in full-scale production.

A new method of insulating magnetic coils with plastic sealing sleeves covers all inner and outer surfaces in one operation. A sealing sleeve is slipped inside a coil, the two ends are turned over on the outside, and the sleeve is allowed to air dry.

A new pilot crash-helmet is low pressure molded of glass cloth and styrene-polyester resin. The lining is cellular cellulose acetate and foam rubber with entire unit contoured to fit the head. The helmet has molded-in removable earphones.

New modified polyvinyl alcohol resin rollers have better wearing qaulities than rubber or leather rollers. Plastic rollers are unaffected by fuels and oils, and are lightweight, non-smearing, wear- and abrasion-resistant, and devoid of static-charge accumulation.

Size limitations on plastics are reducing in number. Thermoplastic tubing up to 10-in. dia. and flexible tubing to 3-in. dia. of clear or colored material are available. At the other end of the scale is polyethylene packaging film of 0.0005-in. thickness.—Prod Eng, Ap, 106

COOK CAST CABLE DUCTS

Casting process involving air-entrained concrete, vibration, and steam cooking, has been developed by Rocla, Ltd., Melbourne, for circular bell-and-spigot, multichannel concrete ducts to house underground cables. Ducts are cast vertically in steel molds. Four to six steam tubing cores, to form cable ways, are held in place by end plate.

Quite dry air-entrained concrete is poured around core tubes by overhead skip and is electrically vibrated. Controlled-temperature steam blown into tubes expands air, increasing the volume of the mix.—Cons Meth, Ap, 113

MECHANICAL HANDS—Operated remotely, these mechanical hands will play an important role in handling radioactive materials. Developed by General Electric Co., the hands will be able to work within pile while operator follows operation through mirrors. — Business Wk, Ap 24, 74

HYDROFLAPS OR HYDROFOILS MAKE DITCHING SAFER

Tests conducted on 17 different aircraft by the National Advisory Committee for Aviation (see McG-H Digest, March, p. 32) on ditching of planes, resulted in recommendation for the use of hydroflaps or hydrofoils on transoceanic land planes.

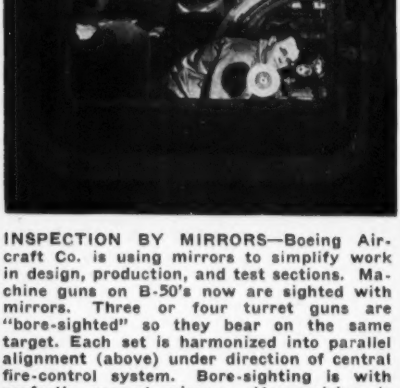
The hydroflap, beneath plane's nose or engine nacelles, absorbs water impact and permits craft to plane, thus keeping forward section out of the water until forward motion is dissipated. It should be comparatively narrow and project downward a sufficient distance to permit both flap and tail to hit the water simultaneously. It should retract into nose or nacelle. On the Martin XP4M-1, the flap sustained a 10,000-lb. impact when lowered to 30°.

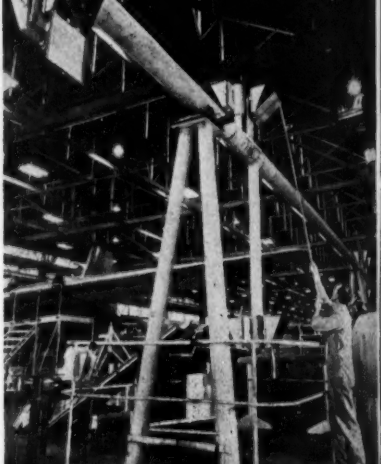
The hydrofoil accomplishes the same thing in a different manner. It is a V-type plate with a span of several feet, suspended below plane nose. Its chord is about the same as the fuselage reference line. During setdown it sinks 4 or 5 chord lengths and forward motion tends to lift it to the surface. They should have trapezoidal planforms.—Aviation Wk, Ap 12, 19

HORMONES FATTEN POULTRY

Synthetic hormones, or estrogens, to fatten poultry are still in experimental stage, according to Oregon State College. They produce capon characteristics in roosters and increase rate and amount of weight gain in all chickens.

Estrogens are introduced by insertion of a pellet, slightly larger than BB shot, under the loose skin of the neck. The small incision is then stitched. Average dose is one pellet very 2 wk. Overdosage causes bird to eat less and lose weight.—Food Ind, Ap, W26





INSPECTION BY MIRRORS—Boeing Aircraft Co. is using mirrors to simplify work in design, production, and test sections. Machine guns on B-50's now are sighted with mirrors. Three or four turret guns are "bore-sighted" so they bear on the same target. Each set is harmonized into parallel alignment (above) under direction of central fire-control system. Bore-sighting is with perfectly ground mirrors. Harmonizing is with seven mirrors in a 98-ft. steel pipe (right). This insures that all guns concentrate on the target selected.—Business Wk, Mr 27, 68

ONE-MAN STOCK CONTROL SIMPLIFIES ORDER FILLING

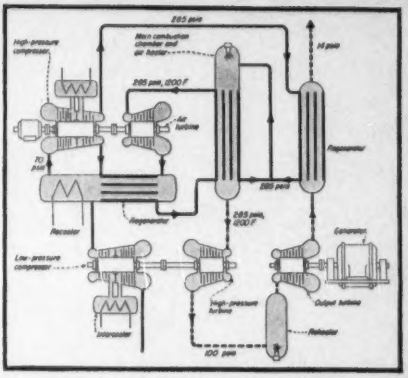
Handled by one person, four cards in a Kardex pocket, a set for every item handled by the J. W. Minder Chain & Gear Co., consolidate all necessary data needed for operation. The four cards are: (1) a perpetual inventory card on the bottom when the pocket is opened, (2) a blue unfilled or back-order sheet, (3) a purchase record (half width to left), and (4) a sales summary (half width to right).

When an order is written, stock control deducts the quantity from the figure on the permanent stock card. If insufficient stock is on hand, the amount available is deducted and shipped against the order and the balance is back ordered and entered on the blue sheet. The inventory card records all sales before shipping department fills orders. Stock received is also entered on records as soon as it is checked by the receiving department.

The unfilled order sheet contains, in simplified form, the date, sale or delivery number, customer name, and quantity of each back order. Copies of back orders themselves are filed, by customer, in a separate file.

The top card, divided into two sections, controls stock purchases and monthly sales with space for quarterly footings, year's total, and monthly average. The left-hand side records all stock orders placed, amount scheduled to be received each month, scheduled shipping date, and quantities received against each order. This enables the purchasing department to keep stock orders at a normal inventory level plus an allowance for back orders.

The right side of the card simplifies ordering by showing "order point." This is done with a colored indicator which is moved up a small scale containing divisions for "follow-up," "order point," "normal stock," and "over stock." —Mill Supp, Ap, 87

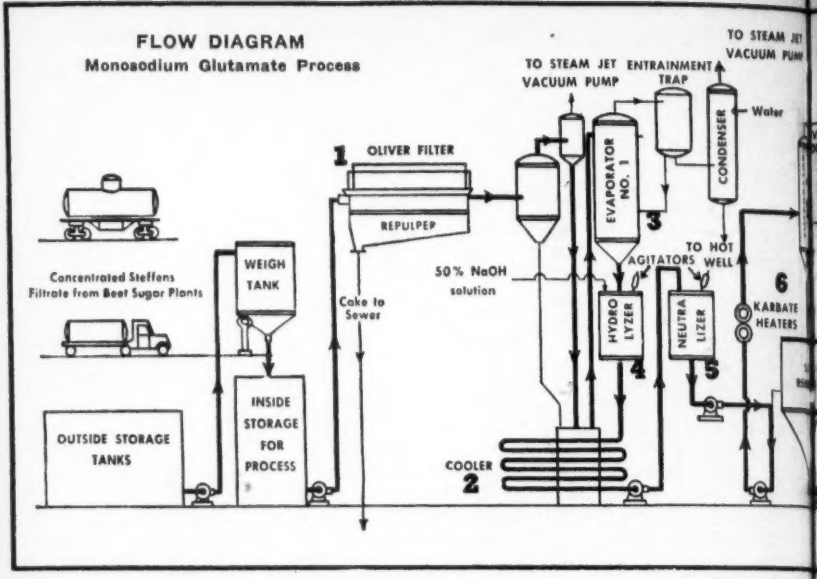


GAS-TURBINE PLANT—Ready for service in 1949, a 20,000-kw. high-pressure gas-turbine plant at Wintherthur, Switzerland, will operate on a semi-closed cycle. Clean air is handled in a closed cycle, consisting of a two-cylinder inter-cooled compressor driven by an air turbine, regenerator and recooler. This air supports combustion in a heater which supplies combustion products to two gas turbines. One drives the compressor pumping fresh air into the closed cycle, the other a generator to furnish useful output. Efficiency is expected to exceed 30% on heavy fuel oil with turbine throttle temperatures at 1200° F.—Power, Mr, 87

AUTOMATIC STARCH CONTROL

Formerly two men moved, lifted and mixed sacks of starch in the slasher room of Beaumont Mfg. Co. Job took 15–20 min. per kettle batch. Now one man handles and dumps a kettle of starch in 1 min. Not only has there been a saving in time and man power, but also less starch is wasted and plant is easier to clean with the new system.

Sacks of starch are delivered to a second-story warehouse and are dumped through a screen into a 8 x 12-ft. steel storage bin. A screw conveyor moves starch 50 ft. to a bucket lift which empties into a second screw. This screw feeds a hopper which is placed above the cooking size kettle.—Textile World, Ap, 122



Monosodium Glutamate Plant

As a savoring agent, monosodium glutamate restores delicate flavors to fine foods. Now it is produced from a byproduct of beet-sugar industry

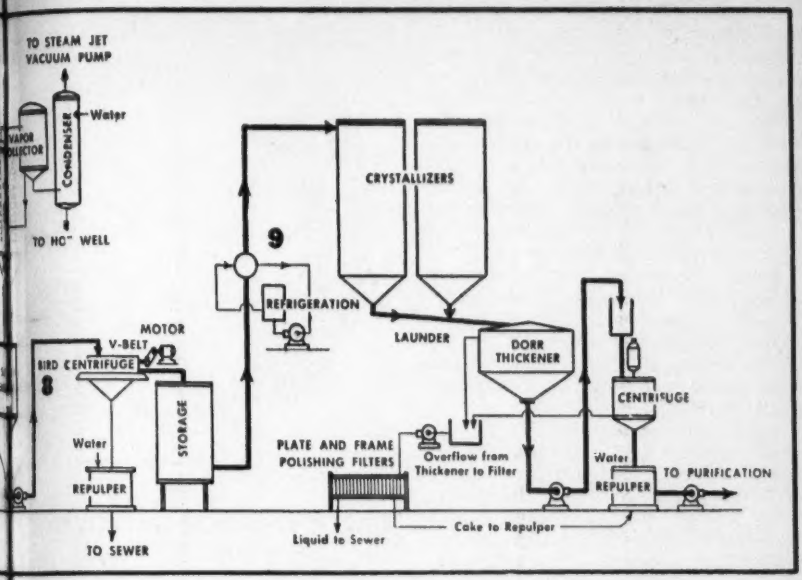
WELL KNOWN as a flavor accentuator for food products, monosodium glutamate is being produced by International Minerals & Chemical Corp. in a new $3-million Calif. factory from concentrated Steffens filtrate. One-hundred tons of filtrate per day is used from beet-sugar factories which formerly wasted it.

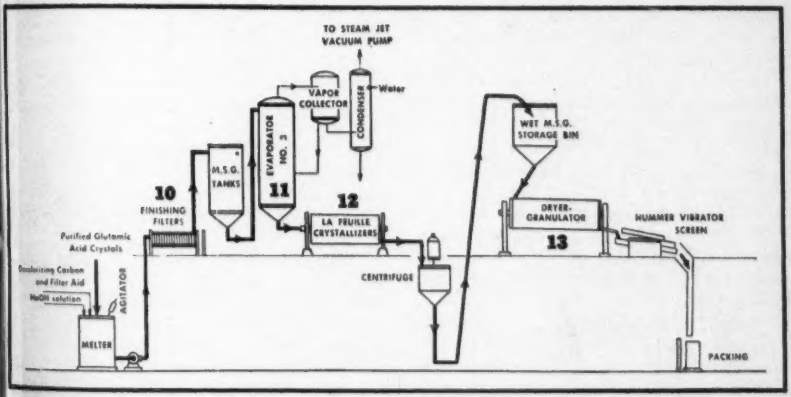
Glutamic acid, from which monosodium glutamate is made, is present in sugar beets in the form of glutamine. During processing of the beet sugar juices, the glutamine is changed to the internal anhydride, pyrrolidone carboxylic acid which remains in the molasses.

In desugaring molasses by the Steffens process, it is first diluted to about 5–6% sugar, then contacted with freshly burned lime to form calcium saccharate. This is insoluble and is removed by filtration, then returned to the sugar process.

The resulting solution was usually wasted. But International Minerals & Chemical Corp. arranged with sugar producers to concentrate the Steffens filtrate. It is carbonated with lime kiln gases to precipitate calcium carbonate, concentrated to about 65% solids, and shipped to the monosodium glutamate plant.

The Steffens filtrate, when received, is first blended to get a uniform quality, then passed from storage tanks to a weighing tank and on to an Oliver pre-





coat filter (1) [see flowsheet]. Next it passes through a heat exchanger (2) on its way to a single effect calandria evaporator (3) in which its concentration is adjusted.

The liquid is run into steel hydrolizing tanks (4) along with a 50% solution of caustic soda. Here the pyrrolidone carboxylic acid is hydrolyzed to glutamic acid. After cooling, the hydrolysate is acidified with HCl in neutralizer (5), passes through Karbate heaters (6), and

is concentrated in a forced-circulation evaporator (7).

Mineral salts are removed by a Bird continuous centrifugal station (8), and the pH of the filtered solution is adjusted to the isoelectric point of glutamic acid. The liquor is chilled by refrigerated Karbate coolers (9) and passes into large, rubber-lined crystallizers. Crystallization requires 5–6 days, during which time glutamic acid crystals form along with sodium chloride and other solids.

From the crystallizer, the slurry enters a Dorr thickener. The underflow is passed through a battery of Western States centrifugals, while the overflow is run through plate and frame polishing filter presses along with the filtrate from the centrifugals.

After leaving the centrifugals, the crude glutamic acid is refined. The refined material is changed to a solution of monosodium glutamate by caustic soda, filtered (10), and then concentrated in a single effect evaporator (11) to the proper density.

The solution goes to the LaFeuille crystallizers (12) in which the crystallizing cycle is automatically controlled. When the cycle is completed, the slurry is discharged, centrifuged, and dried by hot air in a rotary drum drier (13). The product is screened for size and packaged in 200-lb. lots in fiber containers.

Although the flowsheet makes the process appear simple, it is actually complex. Both hydrochloric and glutamic acids are corrosive and a mixture of the two is extremely so. Only one type of stainless steel and rubberlined equipment have proved satisfactory.

Furthermore, glutamic acid in its active, or L (+), form tends to change to the racemic mixture under certain conditions. Also, in solution it may reconvert to pyrrolidone carboxylic acid.

As usefulness of the product depends on its high purity, the process requires exceedingly careful chemical control. —Food Ind, Ap, 72; Chem Eng, Ap, 100, 136

Tire and rim size are compared—new tire is shown at the rear

CAR RIDE MUCH IMPROVED ON LOW-PRESSURE TIRES

ELP (extra low pressure) tires are now standard equipment on several new U. S. car models. They guarantee a smoother ride and longer life. The new tires are 8% wider than conventional types for smaller cars, 12% wider for medium and larger cars. They hold 12–25% more air by volume; they carry 24 lb. of air as against 28–32 lb. for standard ones. Rims are ½ in. wider than conventional small tires and 1 in. wider than larger tires.

They absorb bumps 22% more effectively and lateral shock absorption is good. These qualities will reduce mechanical wear on the car. Tires run cooler because of fast heat dissipation through larger tire carcass. Tread life is said to be 15% longer. Tires are available in 4- and 6-ply models.

With the softer tire, steering is more difficult. Some steering adjustments necessarily will be made; one manufacturer is decreasing caster of wheels.—Am Auto, Ap, 21

AMPLIDYNE CONTROLS ON CAGE, SKIP HOISTS

Canadian Johns Mansville has installed a 200-hp. amplidyne-controlled cage hoist and a similar 1,000-hp. skip hoist in its Jeffery mine operation. The amplidyne and electronic controls working together regulate maximum voltage or speed, maximum current and torque, and rate of change in acceleration. It is possible to throw controller from full hoist to full reverse without tripping circuit breakers or causing discomfort to riders.

The 200-hp. unit hoists a 12,000-lb. cage with 13,000-lb. load and an 18,500-lb counterweight at 500 fpm. At slower speed and with a 25,000-lb. counter weight, it will lift 26,000 lb. The 1,000-hp. unit can handle two 15,000-lb. skips in balance, one of them carrying 21,200 lb. Speed is 1,200 fpm.—Eng & Min J, Ap, 81

WORKING FROZEN GROUND

To obtain 400,000 cu. yd. of earth needed for an earth-fill dam 40 miles from the Arctic Circle, contractors used 52° F. water to thaw ground and wash off overburden. Natural thaw penetrated only 2 ft.; working season lasted only 150 days. A network of pipes with 300–400 sprinkler heads was laid over the area and a 4- to 6-in. layer of overburden was washed off each day.

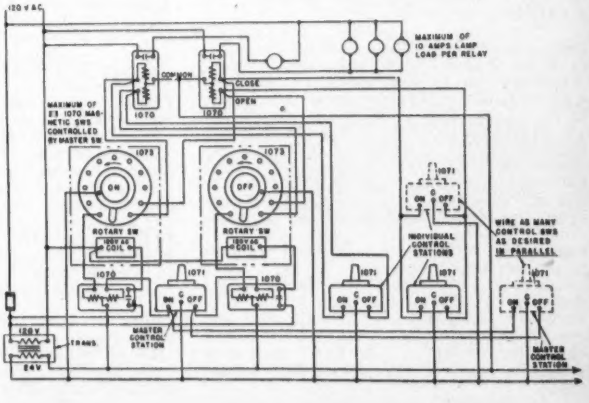
Because water supply was limited, waterbourne overburden (water contained 25% solids) was pumped through a 24-in. discharge pipe by a 125-hp. diesel pump to a tundra area. Tundra provided a natural filter and clear water, augmented by ice freed from ground, was reused.—Cons Meth, Ap, 92

VEGETABLE-OIL EXTRACTION

New solvent extraction process, the Bonotto system, promises to increase output of vegetable oils containing fatty acids. In a Swift & Co. pilot plant, it will extract from cotton-seed residue the oil remaining after mechanical extraction.

Improved equipment design provides: (1) minimum creation of fines; (2) high difference of oil concentration between seed and solvent; (3) even, effective contact; (4) no unextracted solids bypassing to reach outlet; (5) minimum extraction time; (6) economic extraction; and (7) low solvent-to-meal ratio.—Chem Eng, Ap, 76

SILENT RELAY SWITCHING — Low-voltage switching for residences is easy and practical by Square D Co. system "Saflex." One side of secondary is common to center point of automatic center-return toggle switch; other is connected to common of mechanically latched relay. As relay coil is energized only during operation, it can be controlled from any one of several switches. Several rooms can be lighted from single control point. — Elec West and Elec C&M, Ap, 74



TECHNICAL SHORTS

Sidewalk Snow Melter—An electric snow-melting system, installed by Rockland Light & Power Co., New York, has General Electric lead-covered resistance cable (nickel-chromium alloy) in galvanized steel conduit embedded in concrete. Total connected load is 54 kw. at 230 v., 60 cycles, sufficient to melt snow fall of 1 in. per hr. at 26° F. Advantages over hot-water or steam systems include ease in maintenance and elimination of extra boiler demand. Costs are comparable.—Elec World, Ap 10, 128

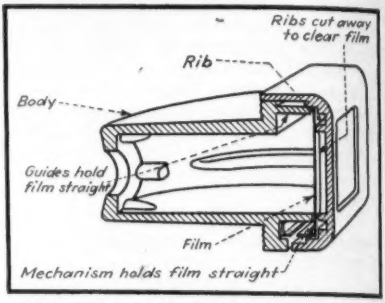
Seals Knots—Knotty lumber can be upgraded for use on exterior siding by a new knot sealing compound composed of Bakelite and vinylite plastics. Applied by brushing over unprimed knots, it prolongs paint life.—Chem Eng, Mr, 163

To Save Food—Hailed as a new grain saver, a pressure sprayer distributes a mixture of molasses and urea on field grain stubble—cows follow and enjoy the cropping. A second way: to prevent potatoes from freezing while enroute to foreign shores, U. S. shipyard developed apparatus to pump hot air into the ship's holds.—Food Ind, Ap, 140, 142

Blow 'Copter Blisters—Plastic blisters of Bell Aircraft Corp. helicopters are blown from large plastic sheets, the finished blister having almost all the optical characteristics of the initial sheet. Sheet is laid flat on fixture, oval sealing ring clamping it around the edges. Air does the rest.—Business Wk, Ap 10, 70

Future Skyscrapers Welded—Predicted by B. L. Wood, American Iron and Steel Institute, is extensive use of steel panels for secondary floor construction in future skyscrapers. Made of light-gage steel, 30-ft. square panels are easily handled, placed, and welded.—Weld Eng, Ap, 93

Use Expansive Concrete Keys—Using expansive concrete for crown keys on five Paris-Lyon railroad bridge arches, engineers avoided need for hydraulic jacks. Each arch was poured in sections 6 ft. long. In first layer's keystone position, a 3-ft. 10-in. space across arch received expansive concrete. Key space—20 in. thick—was divided into four sections by wooden forms. After pouring and while concrete was still wet, 1-in. holes were made every 10-12 in. and water poured in to expand concrete.—Eng News-Rec, Mr 18, 105



REDESIGNS PLASTIC VIEWER—Redesign of 1940 model improved apperance and provided better film guide without change in die cavities. Only punches were changed. Switching from phenol formaldehyde to urea achieved two-tone color. New model (Tru-Vue Co.) supports film without touching picture area and can be assembled without fixtures. Only machine operation is lens installation with spring clips. A metal advance claw mechanism permits film to be pulled back from the same side of the viewer from which it was inserted.—Prod Eng, Ap, 103

Underground Air-conditioning — To warm winter air entering Noranda Mines, air is passed through a fine water spray, the air picking up heat from the water. The spray forms a 30,000-ton "ice cube." During summer, air is cooled by drawing it over the cube, dropping temperature 15° F. System cost $10,000—Business Wk, Ap 17, 67

Plating vs. Fatigue—Plating affects base-metal fatigue strength. Recent work on chromium-plated steel shows fatigue life reduced from 8 to 50% by a 0.0001-in. plate. Least effect was produced when plate was applied at 55° C. in upper end of bright-plating range. Lower plating current density introduced greater reduction in fatigue strength. Baking, to reduce hydrogen embrittlement, and electrolytic polishing prior to plating were detrimental, but nitriding was beneficial.—Prod Eng, Ap, 109

Mobile Scaffold—Mounting their scaffold on the bed of a GMC truck during painting of cornices and trim greatly speeded refurbishing of the U. S. Bureau of Reclamation Bldg., Antioch, Calif.—Cons Meth, Ap, 111

Jaw-plate Liners Redesigned—The 15x24-in. flat solid steel jaw-plates at Donovan mill were replaced by a cast-steel frame with a welded-on, curved, abrasive-resistant liner. Old liner cost $130, lasted only 2 wk., and handled 90 tons of ore in 8-10 hr. The new plates cost $50, last over 6 wk., and handle 90 tons (daily output) in 4-6 hr.—Eng & Min J, Ap, 104

Raises Static Thrust—An exhaust nozzle bleed for standard turbo-superchargers, developed by the Navy, produces 214-lb. static thrust. Turbo is operated by a single combustion chamber from a standard jet engine at 26,000 rpm. and inlet temperature of 1600° F. The 181-lb. engine is for pilotless aircraft of guided missiles.—Aviation Wk, Ap 5, 16

Bearings Reconditioned at Cards—Bearing reconditioning at card can be accomplished at a saving of time and quality. Bearings are bored out and special case-hardened journal inserts of correct size are pressed in. Journal is built up and turned on lathe and self-lubricated bearing inserts are placed over journals.—Textile World, Ap, 262

Ice But No Snow—Ice cubers turn about 21% of each 300-lb. cake of ice into waste snow. Disposal is a problem, so one U. S. plant pipes warm condenser discharge water to the cuber and sprays it over the cuber saws. The snow water then drains back to the well for priming the makeup pump.—Oper Eng, Ap, 38

Dries City Gas—South Australian Gas Co. treats gas in cooling plants to reduce dew-point and prevent moisture deposition and rusting in mains. Freon freezing unit is used in combination with a novel evaporation pre-cooler in which gas is sprayed with water in a cooling tower.—Chem Eng, Ap, 197

Keeps Management Informed—To keep department heads informed, Monarch Machine Tool Co. uses daily "management reports" covering over-all sales and productive outlook data. Orders are expressed in both machines and dollars for the day and month. Visitors expected during the day, and their company affiliation, are also listed.—Factory, Ap, 67

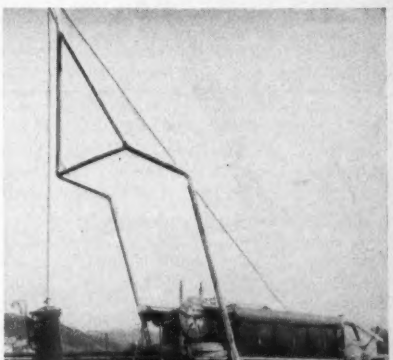
Speeds Plane Loading—Baggage for Pan American Airways' planes is loaded in a fraction of previous time with conveyor-belt loaders. Three men form crew—one loads conveyor from ground, two place baggage in cargo hatch.—Aviation Wk, Mr 29, 37

Handy Parts Cleaner—Portable, welded-steel unit, 14x56x30 in., is mounted on wheels, has hinged drop leaves, and tool tray for convenient work bench.—Power, Ap, 120

Welds Thick Aluminum—Aluminum slabs, up to 2½ in. thick, have been successfully welded at Battelle Memorial Institute by argon-shielded tungsten-arc process. This development is expected to expedite plans for production of gasoline from natural gas and oxygen, because aluminum, having good mechanical properties at low temperatures, is well suited to construction of vessels for production of liquid oxygen—Weld Eng, Ap, 72

X-rays Check Chemical Contents—Quick determination of tetraethyl lead in gasoline, acid concentration in water, percent chlorination of a plastic, or percent ash in coal is made by measuring and comparing X-ray absorption of both a sample and a reference by use of X-ray photometer. Method is independent of physical state of substance.—Electronics, Ap, 158

Concrete Wind Tunnel—Plywood forms on tubular steel scaffolding simplified construction of the De Havilland Aircraft Co. Ltd.'s, two 200x30 ft. hexagonal concrete wind tunnels. The two legs of the H-shaped tunnel are connected by a steel frame workshop at center.—Eng News-Rec, Ap 22, 17



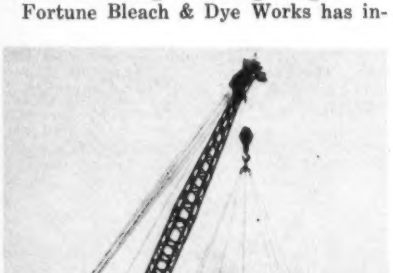
DOG-LEG BOOM TRUCK—New type boom truck, built and used by Oilfield Electric Co., Ventura, Calif., saves time and effort in line construction and equipment installation. Modified A-frame has a dog leg which allows it to rest over truck cab. Operated by hydraulic rams, it offers flexibility and ease of loading and unloading by two men. Loading time is cut to one-third of that for conventional methods.—Elec World, Ap 10, 120

New in Knit-Goods Finishing

Development, both new and pending, have had wide effect on industry. Continuous processing methods for knit goods gaining favor with industry

KNIT-GOODS PROCESSING has changed vastly in recent years through use of new machinery and techniques. It will progress even more when pending developments are announced. The adaption of continuous-processing methods by a few mills has served to boost finishing. Many mills are planning to install continuous ranges in future plant layouts. These processes will be used both prior to and following bleaching ranges.

Fortune Bleach & Dye Works has installed a continuous bleaching range for knit goods, processing 1,000,000 yd. per week on a 2-shift operation. Equipment is all stainless steel. Although final cloth speeds depend upon weight of material, the mill expects to operate between 75–150 yd. per min.



PREFAB BASEMENT FORMS—Construction of 1,400 basements for a Virginia housing development was speeded with this one-piece, 24x29-ft. form. Floor slabs were placed in advance, then crane swung form into place. Forms are 8-in. wide standard steel panel. Turnbuckles, at center of lower wall, spring the forms in. This breaks the bond between forms and concrete, and entire form is lifted off as a unit.—Eng News-Rec, Mr 25, 15

With jersey-knit, 4-yd. fabric, top speed of 150 yd. per min. is possible. Some fabrics can be run through range double, thus speeding output. At a speed of 150 yd. per min. for 4-yd. goods, ranges have a capacity equal to 4 or 5 kiers.

E. I. duPont de Nemours & Co., Inc., has developed a bleaching range for knit goods which will take fabrics ranging from plain jersey to tricot material. Fabric-weight capacity is about 1 to 9 yd. per lb., the heavier the fabric the slower the output.

Fortune's bleaching range is a 1-stage unit, divided into two sections that can be controlled separately. Cloth movement is continuous and uninterrupted except for a 1-hr. storage in J-box. Since the 1-hr. J-box supply is built up ahead of time, there is no halt in discharge. Range consists of a slack-loop washer, a rope squeezer, and a finisher saturator.

A suction-dryer for tricot-fabric drying has been developed by Proctor & Schwartz. Fabric feeds to a rotary perforated cylinder through which air is drawn. Fabric is held on the cylinder by a fabric endless belt.

The U. S. Army Quartermaster Corps has announced results of its wartime tests on prevention of shrinkage in wool socks. Four shrink-proofing processes were tried: halogenation, resin, alcoholic potassium hydroxide, and enzymes. Best results were obtained with controlled chlorination, a halogenation process.

Hypochlorate treatments of several

concentrations were investigated, using calcium hypochlorate containing 70% available chlorine. The calcium hypochlorite was added over a period of 20 min. in a buffer solution and machine was run for 10 min. Then 1% sodium bisulphite was added, and socks were rinsed and dried. With 12% calcium hypochlorite, shringage was 5%, alkali solubility was 18.6%, and weight loss 8.6%.

Shortages of dyes and beta-naphthol still plague knit-goods dyers and finishers. Good dyes for nylon are still needed by hosiery manufacturers.—Textile World, Ap, 103

FASTEST CAMERA AIDS HIGH-SPEED STUDIES

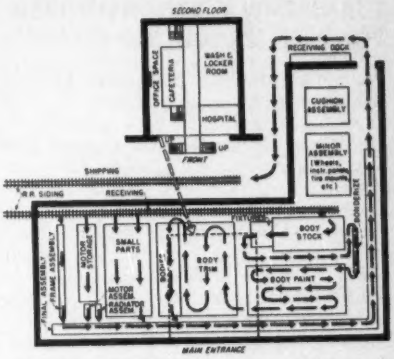
Ten times faster than any camera previously made, a shutterless motion picture camera takes 11-million pictures per sec. Fifteen small identical lenses are mounted side by side, with a line joining their centers slightly inclined from the horizontal.

Each lens forms a separate image, the images appearing as a flight of steps. When images are received on a metal plate having a horizontal slit, the slit picks up top of picture from first image, a strip next below from second image, and so on. The single long and narrow strip is then imaged on a negative film as a narrow line.

The film is driven past this line image perpendicularly at 400 fps. The narrow image is drawn into a streak by the moving film, and variations in negative density across the streak contain all elements of a complete rectangular picture for the instant of time represented by position along the streak.

Negative films need move by only the width of the slit image to produce a new frame of the original picture. After processing, the negative must be reconstructed into the original picture by projection back through a similar optical system in an automatic projection printer.

Intended uses are in industrial research and in study of high explosives, electrical discharges, shock fronts, and projectiles.—Prod Eng, Mr, 161



PLANT-LAYOUT BENEFITS—Layout of Ford's Los Angeles Lincoln-Mercury plant provides a smooth material flow. Backtracking is eliminated and materials-handling equipment is utilized to fullest degree. While this layout is for automobiles, it can be applied widely to a variety of products where number of employees is not more than 1,500. Further benefits are to regulate worker movement in and out one entrance, localize employee activities at that entrance, reduce guard expense, and ease administration.—Am Mach, Ap 8, 85

EMPLOYEES SEE RATINGS

Showing employees of Krisson Printing Ltd., London, their rating sheets, filled out bimonthly by their foreman, has resulted in better employee relations. Ratings are based on technical ability and personal character. With a possible top score of 100 points, a bonus is given to all employees scoring over 80 points.

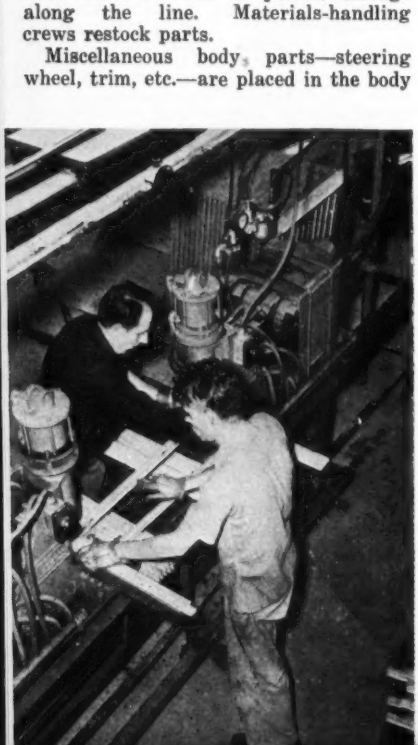
After ratings are filled out, the employee meets with the works manager to talk over his score and ways of improving it. Management has found the interviews an effective means of uncovering minor grievances which otherwise go unreported and uncorrected.—Factory, Mr, 88

SUBASSEMBLY SYNCHRONIZED TO MAIN PRODUCTION LINE

Production doubled, productive efficiencies rose 25%, quality improved, and handling costs dropped 30% when Packard Motor Car Co. adopted straight-line flow. All component subassemblies are assembled on balconies parallel to the final assembly line. Subassemblies are dropped to final line at the point of attachment. Plan eliminated annual downtime while models changed.

All materials are received at various substations close to point of use. Inspection is performed there to keep defective parts from reaching assembly. Component and main assembly lines were stretched out to permit storage along the line. Materials-handling crews restock parts.

Miscellaneous body parts—steering wheel, trim, etc.—are placed in the body while it is on the line, and are carried until they reach station of attachment.—Factory, Ap, 56



FLUORINE PROGRESS

Production of elemental fluorine has been put on a commercial scale by Pennsylvania Salt Mfg. Co. Electrolytic cells have been developed, each to produce 60–80 lb. of fluorine daily while operating at 1,500–2,000 amp.

The cell is a rectangular welded-steel vessel, having interdependent and interlocking covers for anode and cathode sections. Anode assembly consists of carbon plates attached to alloy holding shoes arranged in single row between two cathode assemblies.

Cell is charged with solid KHF_2 and liquid AHF. During electrolysis, AHF dissociates to form F_2 gas at anode and H_2 at cathode. Handling of fluorine is simplified by use of compounds that readily give up combined fluorine. These include polyfluorides, chlorine trifluoride, and sulphur hexafluoride.—Chem Eng, Ap, 102

TAKE-HOME PAY UP 70%

Sash Balance Co. took a 6-mo. production average for sash balances per man-hour and established a bonus system paying 5% of base pay per balance produced over the 15 per hr. average. At the end of the first bonus week, 24.5 units per hr. were produced. One day bonuses ran 115% of base pay. Pay checks are up an average of 70%.—Factory, Ap, 83

WELDS STORM SASH — Sub-frames of storm sash, which hold screen and glass panels, are projection-welded on specially built machine at Corry-James Mfg. Corp. Two operators weld two corners simultaneously, the machine making 16 welds every time it closes. Two 75-kva. transfer heads travel back and forth on 12-in. track between operators. Track bed can be adjusted for different-length rails. Steel arms fastened to the heads support top and bottom rails and carry sliding gages adjustable to specified frame widths.—Weld Eng, Ap, 58

FLYING CAR—In flight, Consolidated-Vultee Aircraft Corp.'s "Convair Car" is powered by a 190-hp. Lycoming engine turning a 3-blade propeller. On the ground, "car" is powered by a 26½-hp. Crosley rear engine. Dashboard is a blend of car and plane dashboards. Auto and flight controls are separate, control stick swinging down from the roof. When fuselage is used as a car, plane section is held in place by two jacks in the wings and a jack in tail fin.—Aviation Wk, Ap 19, 21

MESONS LAB-CREATED

For the first time, mesons which heretofore have been found only in cosmic rays have been artificially produced. At the University of California, meson tracks have been observed on photographic emulsion plates placed adjacent to targets of carbon, beryllium, and other materials which were bombarded by 380-Mev alpha particles from the 4,000-ton cyclotron.

This achievement is regarded as the most significant event in fundamental nuclear studies since the discovery of uranium fission. It is expected to open up unprecedented opportunities for understanding sub-nuclear processes, particularly the nature of the force that holds the nucleus together and interaction of nuclear forces. Its use under controlled conditions will enable study of critical nuclear processes in which the meson is involved.—Nucleonics, Ap, 71

HOW TO TEMPER CHOCOLATE

Careful control of melting and cooling operations gives chocolate a dense crystal structure and the desired brittleness and glasslike surface. Melting temperature and cooling time depend on type of chocolate.

Melting should be done at 100–110° F. Higher temperatures waste steam and water, and may destroy texture and flavor of milk chocolate. Cooling requires 20–60 min., depending on capacity of tempering kettle and temperature of cooling water. Cooling water should be run through kettle jacket slowly to avoid solidification of the chocolate on the inner surfaces and formation of uneven fat crystals.

For average dark chocolate, procedure is to cool to 88–89° F. in 30 min., then raise to 90.5° F. for 20 min. if it is to be held in the tempered state; milk chocolate 86–87° F. in 30 min., then at 89° F. for 20 min. for tempered state; and finely milled milk chocolate 85–86° F. in 30 min., then 88° F. for 30 min. for tempered state.—Food Ind, Ap, 93

QUICK VULCANIZING

Extruded rubber products—strip, channel stock, tubing, and thread—are now vulcanized electronically in a B. F. Goodrich Co. process. It has cut vulcanizing time from 1¼ hr. to 2 min. Rubber is subjected to energy waves of speeds up to 186,000 mps., creating internal friction by exciting rubber molecules. Temperatures of 300° F. are created.—Business Wk, Ap 17, 70

PMA—NEW DU PONT RAW-NYLON WARP SIZE

Sizing and weaving of over 200 continuous-filament-nylon warps with PMA (polymethacrylic acid), E. I. du Pont de Nemours & Co., Inc.'s, new size, have proved most successful. Formulated as a water soluble, it is easily applied and removed and has excellent adhesion to raw nylon. The size practically eliminates shedding at the loom. It is best applied to raw nylon.

Glycerine or ethyl glycol, alone or in combination with sulphonated mineral oils, has been used as a plasticizer. Some polyhydric alcohols are compatible and miscible with PMA and give true solutions.

Water is placed in size kettle and agitation is started before solution is poured into the vortex of the water. Solution must be added slowly to prevent lumping. Temperature of the solution should be raised slowly. After PMA is added, glycerine or ethyl glycol should be entered, agitation continuing. When oils are added, excessive agitation should be avoided to lessen foaming.

In size with glycerine or ethyl glycol, temperature in size box should be a steady 150° F. If sulphonated mineral oil is used, temperature should be under 130° F.—Textile World, Ap, 129

EARTHQUAKE-PROOF DESIGN FOR STEAM POWER PLANT

Continuous power generation during seismic disturbances will be possible in a new Los Angles 240,000-kw., 4-unit steam generator plant. Structure was designed to withstand disturbances of the order of 0.2 g.

Piles (2,300) were driven down to 40 ft. to carry through compressible strata to underlying sand. They support separate foundations piers which are tied together by reinforced concrete struts. Superstructure is heavily braced by two separate bracing systems—one longitudinally and one transversely across the station. Main bracing is the reinforced concrete exterior walls and a system of diagonal members in the steel framing system.

To insure the foundation acting as a monolithic unit, all pile caps including the turbine foundation mats were interconnected by heavily reinforced concrete struts. Boilers are hung from a point 100 ft. above pile caps. Provision is made for several inches of vertical and horizontal thermal expansion of boilers between operating and non-operating conditions, yet they are restrained from violent movement.—Eng News-Rec, Mr 18, 102

NEW CRASH-STUDY PLAN SHOWS AIR-ACCIDENT CAUSE

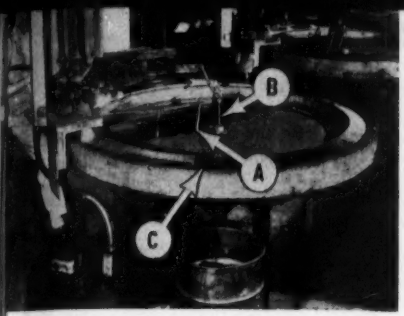
Chemical analysis of soot scrapings, reconstruction of wreckage parts, and plotting of wrechage parts aided Civil Aeronautics Board's investigation of the recent DC-6 crash in Bryce Canyon. Before the curious entered the area, CAB roped it off and plotted all plane fragments and their positions were evaluated in relation to impact marks. This plotting aided in determining plane's impact angle and future gyrations.

After plotting, wreckage was shipped to the Douglas plant where parts were reassembled in their original position alongside unwrecked mock-ups. Absence of sections of the wrecked plane indicated consummation by fire of missing elements. Chemical analysis of soot scrapings showed the origin of the flame at various points of the structure—lead concentrations in the cabin air-heating system indicated presence of heavily leaded aviation gas in the system during the fire. Barium in ignition system soot indicated inflight firing of the plane's flares.

The new system of investigation proved most successful and may become standard procedure in future crashes. —Aviation Wk, Ap 5, 24

Simpler Work in Small Plant

Central Mine Equipment Co. employs no methods engineer; all 100 employees are methods conscious. Their ideas have cut handling costs 60%; 20% of plant area has been converted to productive work. The company makes the equipment for mine blast-hole drilling. —Factory, Ap, 88

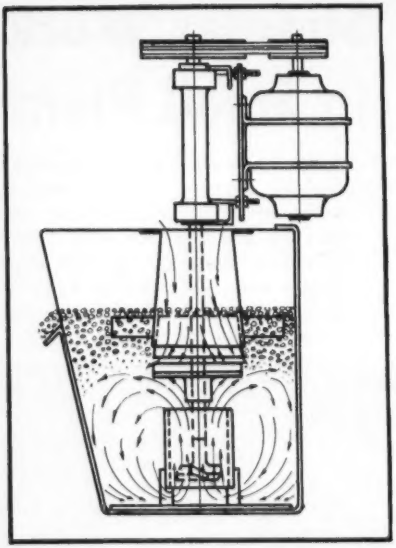


ROTATING hard-surface table makes hard-surfacing of drill bits nearly automatic. Foot lever controls table speed. Mirrors A and B reflect flame, telling operator flame is properly adjusted. Bits drop through hole C.

SPECIAL handling truck for augers improves materials handling. With U-shaped racks, loads can be moved quickly, safely, and easily throughout the plant. About 30% of the floor space was saved; safety hazards were almost eliminated; work was elevated to a convenient position.

PACKAGING TIME for drill bits has been reduced by these special tote pans and new dispensing method. Pans are brought to packaging station by truck and dumped into hoppers. Rakes (arrow) pull bits into convenient position for operator. Work is within easy reach; time reduced 50%.

DRILL BITS are deburred in this tumbler (rear) and fall onto the inclined, vibrating shake-off screen. Compound falls through automatically. Worker rakes bits into special tote pans (arrow) which are carried to packaging department by lift trucks. Cleaning time is cut 40%; quality improved.



UNIQUE FLOTATION MACHINE—Producing an abundance of fine air bubbles without interference with pulp circulation, new Booth Engineers flotation machine is available in 20-54 in. sizes. Light-weight, rigid A-frame supports impeller shaft and motor; froth depth is controlled by new curtain arrangement; impellers are pressure-molded rubber. —Eng & Min J, Mr, 96

SPINS STEEL PLATE UP TO 6 IN. THICK

Unusual application of an old fabricating method spins steel plate up to 6 in. thick and to 18-ft. dia. at Lukens Steel Co. The flat circular plate to be spun to an elliptic dished tank head is held between formers on a vertical-spindle machine.

The concave upper former is attached to a vertical hydraulic ram, and the convex lower one to a vertical jack rotated at 20–46 rpm. by an electric motor and gear train. The hot disk is centered by four vertical rollers geared together so all move in or out an equal amount.

Then the top former is lowered, compressing the hot plate against the lower former and producing the crowned shape. At the same time, an outer cylindrical forming roll spins the plate edge against an inner roll, both of which are rotated by contact with the work.

Dimensions are checked by a steel tape clipped to the edge of the part and stretched around its circumference. The tape is then checked against a cold tape to correct for expansion. Scale is removed by combination of centrifugal force and air blasts.—Am Mach, Ap 8, 8

PUTTING DIESEL ENGINES TO WORK

In putting diesel engines to work in power generation, the user should know something of their efficiency, performance, and cost. Diesels rank high in efficiency. Registering 34–36% thermal efficiency, they top all the widely used power producers. Their efficiency does not vary greatly with size or over a substantial load range.

Performance fuel consumption curves for diesels are relatively flat, compared with those for gas engines. This means that, at lower-than-rated loads, fuel consumption for diesels shows considerably less increase per hp.-hr. Also, high-pressure-injection gas diesels show fuel rates comparable with oil diesels.

Cost of a complete diesel plant, exclusive of buildings, varies with number of engines, kind of cooling system, and other design features. It ranges from $120 to $240 per kw., large plants generally showing lowest unit costs. Addition of buildings brings costs up to about $150 to $275 per kw.

Best economic application is where total plant capacity is 15,000 kw. or less. Diesels are highly suited to standby and emergency power uses. Quick starting and freedom from standby costs, simplicity of installation, and compactness are particularly advantageous in such cases. —Power, Ap, 63

COLD-HEADING PRACTICES ALMOST UNLIMITED

Producing an almost limitless variety of products, cold heading demands considerable know-how to obtain maximum quality and output at minimum cost. The user must know machine application, as to capacity and type of die, characteristics of heading wire, and lubrication and selection methods of wire. Not least of all, he must know die and punch design.

Cold-header dies are relatively simple in design, but their hardness is a critical factor so utmost care must be taken in heat treatment. Even minor changes can have surprising effects. Case thickness should be about 0.125 in. and hardness about 60 Rockwell, while the die body should be approximately 40 Rockwell.

Quenching of dies should be done in special fixtures that force the water or brine through the die hole at 50- to 75-psi. pressure. Throttling the fixture exit for water at about 25% smaller than the die hole causes a partial back flow of water and thorough quenching.

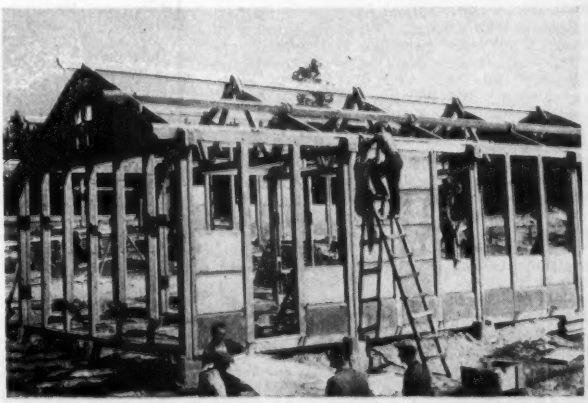
Punches vary in type, with coining-punch design being especially critical. A close approximation on size of coining-punch cavity can be made mathematically, but trial-and-error usually decides the final pattern. Common practice is to leave the punch soft, make one piece, then correct the punch if necessary before hardening.

Wrong design in coining punches leads to cold shuts and an uncontrolled grain flow. The latter condition defeats the function of a coining punch which is to start the metal swelling outward so, at the final blow, the metal will continue to flow and not merely to collapse.—Am Mach, Ap, 99

UNDERGROUND HOUSING

Storage batteries are sometimes a problem to house in outdoor switching stations. Above-ground housing means a wide temperature range the battery must withstand—possibly a swing of 130° F.

This causes an increased charging rate in the summer and less available capacity in the winter. So one U. S. utility has housed a 60-cell, 125-volt battery in an underground vault to take advantage of the fairly constant ground temperature. With the vault located under the switchgear portion of the substation, net cost of vault was $1,400.—Elec World, Mr 13, 128



ALL-CONCRETE HOUSES—Joists, rafters, roof-poles, tie-beams, and all other component parts of this all-concrete house are cast at the site and are raised into place by overhead crane. Walls are concrete slabs, fitted in slots between joists. A 1,220-unit coal mining community of this type home is being erected in French Lorraine.—Eng News-Rec, Ap 22, 4

NEW PRODUCTS

Takes Jet's Temperature—A new indicator, developed by Fairchild Camera & Instrument Corp., measures gas heats up to 5000° F. in turbojets, ramjets, and rockets. Device is said to be accurate to within 1% up to 2000° and to within 2% from 2000-5000°. Metal probes are used for temperatures up to 2300° and watercooled units with iridium orifices for higher temperatures.—Aviation Wk, Ap 5, 28

Modern Lighting—Lighting fixture, intended for surface ceiling mounting in offices, stores, and residences, has spun aluminum reflector, Circline tube, and G. E. ballast. Made by McCullough Mfg. Co., they are available with 22- or 32-watt tubes.—Elec World, Ap 10, 150

Toasts Soybeans—A continuous pressure cooker for processing soybeans is announced by Blaw-Knox Co. Expected to find wide application in other fields, it has a horizontal shell rotating inside a pressure chamber. Continuous charging and discharging are possible at pressures up to 15 psi.—Food Ind, Ap, 172

Prospecting Tool—Portable Geiger-counter radiation detector, made by North American Phillips Co., is intended for locating radioactive ore deposits and lost radium. Tube cylinder has a retractable section adjustable for detection of hard and soft radiation components.—Nucleonics, Ap, 87

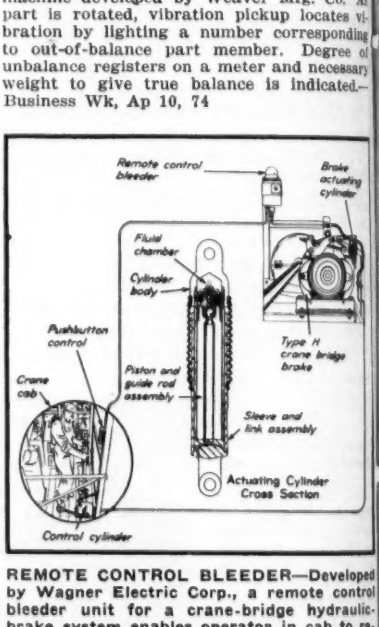
Threadless Iron Fittings—First threadless malleable iron fittings, offered by Stanley D. Flagg & Co., are intended for brazed pipe joints. Brazing is done with a silver brazing alloy that penetrates the joint by capillary action. Advantages are space saving and reduced pipe weight.—Chem Eng, Mr, 143

Relay Handles 12 Circuits—Multi-contact relay, developed by General Electric Co., is for industrial electronic apparatus, communication, and signaling equipment. Contact combinations, from five arrangements, can be stacked to satisfy many circuit-switching requirements.—Oper Eng, Ap, 88

Scours Wool at 80° F.—Vita-Lastic can scour wool at 80° F., thus saving fuel and time. Normal scouring is at 120° F. Wool is passed through a soda-ash bath for 2½ min. Vita-Lastic is a development of Solvent Products, Inc.—Textile World, Ap, 266

Operates Diesel on Gas—A dual fuel attachment, manufactured by Caterpillar Tractor Co., permits operation of Caterpillar diesel D13000 engine on natural gas. Engine is started on diesel fuel and manually switched over to gas operation with pilot diesel fuel ignition. Unit consists of precombustion chamber, pump, and controls.—Power, Ap 118

Big Balancer—Rotating parts weighing up to 3 tons can be tested on a new balancing machine developed by Weaver Mfg. Co. As part is rotated, vibration pickup locates vibration by lighting a number corresponding to out-of-balance part member. Degree of unbalance registers on a meter and necessary weight to give true balance is indicated.—Business Wk, Ap 10, 74



REMOTE CONTROL BLEEDER—Developed by Wagner Electric Corp., a remote control bleeder unit for a crane-bridge hydraulic-brake system enables operator in cab to remove air from system at will. Other advantages are ability to install hydraulic brakes above control cylinder and prevention of air from entering fluid line where temperatures change. When pushbutton and control cylinder pedal are operated, fluid flows from control cylinder through actuating cylinder to supply tank where air escapes through two holes in bleeder filler cap.—Prod Eng, Ap, 95

Portable Ventilator—Motor-driven ventilator of 425-cfm. capacity and weighing only 50 lb. is offered by United Electric Motor Co. Made of sparkproof aluminum, it is recommended for removal of gases, fumes, dust, and foul air from drums, tanks, and other inaccessible places. It is also adaptable for welding, spray-painting, and tank-coating jobs.—Power, Ap, 118

Egg Albumen Substitute—A modified albumen, Pro-Tan, has been developed by T. H. Angermerier & Co. to substitute for egg albumen in baking and candy making. It is easy to handle, imparts quality and shelf life, and is not affected adversely by heat. —Food Ind, Ap, 131

Wide-range Pressure Switch—Designed by Square D Co. for use in control circuits of welding equipment, machine tools and high-pressure lubricating system, pressure switch has positive quick make and break action. Bellows type is available up to 1,000 psi., while piston type for hydraulic use ranges up to 3,000 psi.—Elec C&M, Ap, 104

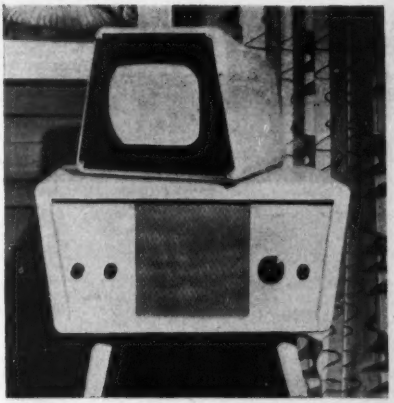
3-cell Concrete Block—F. C. George Machine Co.'s new 3-cell concrete block cuts heat losses through block 10-15% and reduces moisture loss. Cells are long and narrow running the long way of the block.—Eng News-Rec, Ap 1, 104

Hydraulic Test Drill—For test-hole drilling in oil-field prospecting, Century Geophysical Corp. has developed a hydraulic "shot hole" drill. The lightweight drill is faster than conventional drills in shales and equal to others in hard rock.—Business Wk, Ap 10, 68

Flashbulbs Radar-proof—Flashbulbs now can be shipped safely without danger of ignition by radar in radar-proof canisters developed by Sylvania Electric Products. The 17-in. high, 12½-in. dia. canister, weighing 3 lb., deflects the radar waves.—Aviation Wk, Mr 29, 38

Gearmotor Has Nine Ratios—New Westinghouse vertical gearmotor has nine different gear-ratio combinations ranging from 7.61:1 to 38.9:1. They are available in 3-50 hp., 220-440-550 v., 3-phase ac. or 3-7½ hp., 115-230 v. dc.—Am Mach, Ap 8, 160

Versatile Tool Auxiliary—With its own basic power unit, Versa-Mills Co.'s new machine-tool auxiliary will convert a lathe into a multi-purpose tool. With the attachment fixed to lathe carriage, lathe mills keyways, splines, gears, and threads; drills; bores; reams; routes; and grinds external and internal, cylindrical, tapered, and flat surfaces. —Textile World, Ap, 152



SWIVEL SCREEN—This 72-sq. in. television screen is mounted separately on top of the cabinet, permitting screen to be directed to any corner of the room. Cleervue Television Corp. developed the screen.—Sci Ill, May, 75

Gear Pump Has Ball Drive—Gear-type hydraulic oil pump has a ball drive that permits gears to float endwise on shafts, thus preventing thrust loads from being transmitted from shaft to gears. Developed by Adel Precision Products Corp., the unit produces 1,000 psi. at 1,800 rpm. with rated capacities from 1.5 to 60 gpm.—Prod Eng, Ap, 176

Electric Etcher—For marking names, sizes, and other information on ferrous metals, Ideal Industries, Inc., has manufactured an electric etcher having four etching heats. Unit is enclosed in metal case for portability. —Elec World, Mr 27, 140

Long-life Tubes—Developed by Radio Corp. of America for critical industrial applications and specified for 10,000-hr. life (14 mo. continuous service), the new tubes are the 5691, a high-mu triode; 5692, a medium-mu twin triode; and 5693, a sharp cutoff pentode.—Electronics, Ap, 198

Scales Photos—Figuring time in reducing photos or drawing can be cut by a new triangulator developed by Howell T. Young. L-shaped aluminum frame has an aluminum bow, along which slides the variable diagonal. Masking leaves slide on vertical and horizontal bars. Scale is in inches.—Business Wk, Mr 27, 83

NEW PRODUCTS

HOME FOUNDRY—This tiny foundry, designed for home use, handles 10 lb. of aluminum or 34 lb. of brass or bronze. It is for nonferrous castings. It operates on manufactured or bottled gas at household pressures. Working temperatures are up to 2400° F. Developed by Sawyer Bailey Corp., the set comes complete with small furnace, crucible, tongs, crucible holder, skimming and stirring rods, asbestos gloves, and goggles.—Business Wk, Ap 10, 75

Current-leak Detector—Current leakage in dc. power systems with grounded return is indicated by intensity and non-lighting of red and green lights in Mosebach Electric & Supply Co.'s new detector. Unit is placed near line switch and readings are made with the line switch open.—Coal Age, Ap, 174

Plastic Capacitors—The dielectric hysteresis of United Condenser Co. plastic capacitors is 1/10 that of similar mica insulated units. Ratings run to 25,000 v. at 5 microfarads, while leakage resistance is 500,000 megohms per microfarad. Continuous operation is satisfactory at temperatures up to 65° C.—Prod Eng, Ap, 182

Corrosion-resistant Fluorescents—Developed by Sylvania Electric Products Co., the new white Miracoat finish for fluorescent fixtures makes them highly resistant to rust, corrosion, pitting, and crazing. In addition to the protective qualities, reflection factor is not less than 86% and resulting light efficiency 85%.—Mill Supp, Ap, 126

Warper Supplements Knitter—F. N. F., England, has developed a Cascade warper as a counterpart of its tricot knitter. It permits versatility in capacity and beam widths, long lengths of yarn on beam, and high-quality warps. Warper drive originates from a 5-hp. electric motor coupled directly to a hydraulic variable-speed gear unit.—Textile World, Ap, 154

Electric Eye Controls Oil—Photoelectric combustion control for commercial oil burners shuts off fuel flow if the oil fails to ignite or if the flame is extinguished. Developed by General Electric Co., it prevents fuel, on gas-electric ignition systems, from flowing if the gas pilot does not ignite.—Elec World, Mr 13, 144

Plate Heater—Units, to 42 in. wide by 12 ft. long, give even temperature over entire surface up to 700° F. Offered by Industrial Radiant Heat Corp., they consume 6 watts per sq. in. and are made of aluminum, nickel, chromium alloys, and fiber glass.—Chem Eng, Ap, 144

Speeds Tire Changing—Heavy truck tires are separated easily from the rim by a hydraulic tire changer designed by Edwin I Butler Co. Manual labor is nearly eliminated. Measuring 72⅝x30x41 in., device handles 18- to 24-in. dia. wheels. Wheel is rolled onto machine, foot pedal centering tire. Operator operates hydraulic pump handle to push rim out, a release valve letting rim fall free.—Business Wk, Ap 17, 75

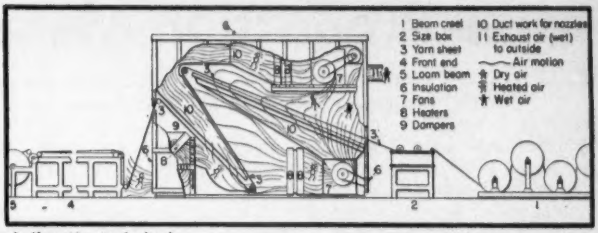
All-Purpose Cutting Fluid—A cutting-oil base which can be diluted with either oil or water, Anti-sep All Purpose Base is high in both sulphur and saponifiable content. Developed by E. F. Houghton & Co., it is claimed suitable for more than 90% of metal cutting and forming operations.—Am Mach, Mr 25, 139

Guarded Washing Nozzle—Spring guard on a flatjet nozzle protects deflector face without interfering with spray. Nozzle is built with two type of connections—a ¾-in. garden hose thread and a ½-in. pipe thread. Nozzle is aluminum; spray is bronze. It is a Spraying Systems Co. development.—Factory, Ap, 108

Sounds Depth—Electronic depth sounder for commercial craft and moderate-sized yachts indicates depths for 0 to 100 fathoms. Developed by Trident Products, Inc., it operates on 6, 12, 32, or 110 dc.—Electronics, Ap, 142

Welding Electrode—Hobart Softcast A is a copper-nickel alloy rod flux-coated for metallic arc welding. Recommended for welding cast iron where weld area must be machined, drilled, or tapped, it is offered by Hobart Bros. Co.—Oper. Eng, Ap, 78

HIGH-SPEED DRIER—Producing at least 1,000 lb. of yarn per hr., this high-speed drier for slashers uses hot-air circulation. In tests, 100% cotton, 100% wool, rayons, and blends of the three have been run through drier successfully. From 70-80% of the air is reheated for reuse. Yarn is not exposed directly to hot-air blasts, special nozzles reducing the air's velocity. About 14 yd. of warp are in the box at one time. Heat loss to outside is negligible, outside panels reaching 105° F. with temperatures inside reaching 260° F. Yarn is 60-70% dry when it emerges.—Textile World, Ap, 150



2-way Hand-truck — Without attachments, Menne Developments' hand-truck is an upright carrier. Adding a third wheel and handle unit converts it into a flat-bed carrier. Wheel-and-handle unit clamps to the tubular handle of the vertical carrier. When used as a flat-bed unit, a 24x40-in. wood platform covers the tubular frame. Load limit is 1,200 lb.—Business Wk, Ap 24, 55

Converts to Stored Energy—Vangtronic Corp. new control for converting ac. spot welders to stored energy employs a trignitron electronic tube. The 210-microfarad, 1,500-v. converter operates at 110-120 v., 50-60 cycles, with speed of 30-180 spots per min.—Weld Eng, Ap, 81

Tractor Scoop—New reversing unit converts a hydraulically-operated farm tractor scoop into a 10-cu. ft. shovel. Loading in reverse, it eliminates hand shoveling. It is a Stockland Road Machinery Co. development.—Cons Meth, Ap, 143

British Textile Dye—A fast water-soluble dye, Alcian Blue, is said to be especially useful for textile printing. Developed by Imperial Chemical Industries, Ltd., England, it can be printed readily on fabrics made from all principal fibers—Chem Eng, Ap, 163

Conveyor Stretches to Job—Portable belt conveyor with short closed length extends to 46 ft. when open. Developed by Standard Conveyor Co., it can be used at any point between open and closed positions to carry sacks, cartons, cases, or bags.—Food Ind, Ap 174

Automobile Awnings — Transparent plastic awnings, developed by Toadroy Mfg. Co., provide shade over side windows. View is not obstructed. Awnings also protect open windows during rains.—Sci Ill, May, 74

New Dust Collector—Hard wool felt is used as the filter medium in Pulverizing Machinery Co.'s new dust-collecting system. Filter bag is surrounded by a blower ring that travels up and down bag, air jetted through felt keeping the felt operative as a filter.—Eng & Min J, Ap, 118

Spot to Butt Welder—Water-cooled attachment, developed by Thomas Electric Welder Co., converts any manual air-operated or motor-driven spot welder to an automatic butt welder. Work capacity is ⅜-in. dia. rounds, 5/16-in. square bars, or ⅛x⅝-in. rectangular bars.—Weld Eng, Ap, 88

Eliminates Tire Static—For improved auto radio reception, a new antistatic powder is especially helpful in synthetic tires. Developed by General Cement Mfg. Co., it is inserted into tires by a special injector.—Electronics, Ap, 202

Glass Insulates Pipe—Claimed to be the first pipe insulation suitable for hot or cold lines, indoors or out, the Pittsburgh Corning Corp.'s Foamglas insulation is available in equal half sections, 18 in. long.—Chem Eng, Ap, 143

Build Your Own Welder—Offered to those who wish to build their own dc. welders, generator model WG-300 is easily coupled to gasoline engine or power take off. A development of Harnischfeger Corp., it has range of 30-375 amp.—Weld Eng, Ap, 80

Non-Toxic Insect Killer—Mariate, containing methoxychlor, is available from E. I. duPont de Nemours & Co. Claimed to have a faster paralytic action than DDT, it is harmless to warm-blooded animals.—Chem Eng, Ap, 163

FREE SERVICE TO READERS

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Mine Production Management

Careful time studies of loading, face preparation, and dispatchi operations will result in raised output and efficiency, lowered co

AMERICAN COAL MINES have not made the same advancements in the application of accepted principles of good management as have other industries in the past 30 yr. In assembly operations, two or more parts are manufactured and later assembled. In mining the problem is the same—the two parts are coal and cars. The two must be brought to the same place at the same time. Many operations must be performed on the coal before it is ready for assembly—placed in cars.

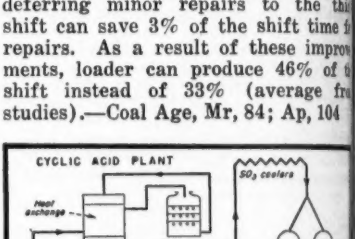
The operations involved in coal preparation must be broken down and analyzed just as the assembly operations in industry are broken down into single-step performances. Time studies made show that machines are in production only 33% of the shift, the remainder of the time being taken up in nonproductive operations.

The time studies show that many delays existing can be charged directly to management: i.e. no cars, no power, no coal to load. It may be assumed that 16% of the time lost for these reasons would have been much greater if losses for other reasons had not totalled 51%, permitting cutters, drillers, shot-firers, and motor crews to catch up with loading.

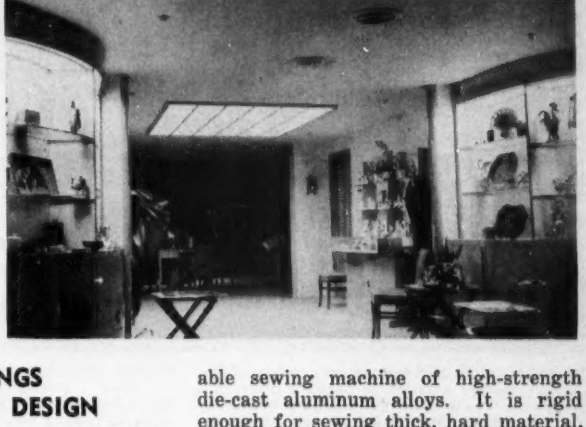
Three problems face management: (1) working loading machines more efficiently, (2) scheduling coal preparation so tonnage available is at least equal to tonnage loading machines are able to load, and (3) scheduling cars so that all of the coal the loading machines produce can be removed immediately.

Loading — Since operating methods vary from mine to mine, studies do not deal with actual operations or sequences. But studies do show these percentages of shift time lost for the following causes: move cars, 21%; move machines and get ready, 12%; machine repair 8%; no power, 3%. Usually 8 to 12 ca are needed to remove a fall. Good trac age permits bringing sufficient cars the face to haul away the entire fall b it often is not done. If this is done, s or more minutes per fall can be save and 10% more time is added to loadin

Changing from tramming the load through cutoffs to tramming throu crosscuts will save two min. per fa Preventive maintenance practices a deferring minor repairs to the thi shift can save 3% of the shift time f repairs. As a result of these improv ments, loader can produce 46% of t shift instead of 33% (average fr studies).—Coal Age, Mr, 84; Ap, 104



CYCLIC H_2SO_4 PROCESS—Sulphuric-a output was doubled at Consolidated Min & Smelting Co., Canada, by redesigning contact unit to a cycle basis handling m ture of 25% sulphur dioxide and 30% o gen. Circulating gas stream (6,000 cf passes from blowers through heat exchang to converters packed with a vanadium ca lyst. Converted gas, containing SO_3 is coo in heat exchangers, then in air-cooled pi before reaching absorbers where SO_3 is moved by contacting with 98.4% H_2SO_4 then passes through spray catchers and co filter. Measured quantities of O_2 and SO_2 are added to maintain required gas co centrations.—Chem Eng, Ap, 96



MODERN LIGHTING—Super lighting, plus electric heating and cooling, feature Bullock's new Pasadena country-club-like department store. This passageway between shops with louverall ceiling light box and circular down lights, equipped with Fresnel lens plates, shows engineered beauty. Total lighting load is 700 kw. for 11,500 fluorescent lamps, 2,000 incandescents, and 1,000 spots and floods.—Elec C&M, Ap, 65

PRECISION CASTINGS FORGE AHEAD IN DESIGN

To get best results from precision investment castings requires three considerations: First is careful selection of alloy. Although any alloy that can be melted and poured into molds can be cast by this method, selection of the right alloy reduces costs.

Second, a careful balance must be struck between contours and dimensional accuracies obtained by casting and those obtained by machining. Finally, a common-sense attitude must be taken on surface finish.

The designer should realize that all casting problems increase with sectional thicknesses, dimensions of uninterrupted flat areas, and abruptness of transition from thick to thin sections. Also, while no physicial limitations on size exist, economic limitations are generally 7 in. on any dimension and 6 lb. on weight.

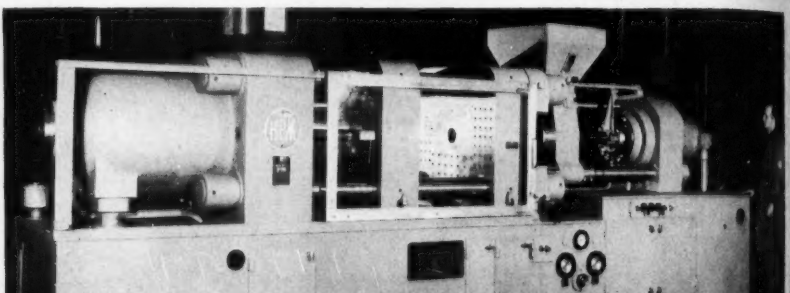
Design and production are applying precision castings to a greater degree than ever before. Stators on the Buick Dynaflow automatic transmission are precision cast of aluminium alloys in plaster molds. Radial vanes are staggered in quadrants and vary in thickness from the outside to the root—a section that can only be made easily by casting.

A Swiss company has produced a portable sewing machine of high-strength die-cast aluminum alloys. It is rigid enough for sewing thick, hard material, yet the lower arm is so small that stockings can be darned on the machine.

A new magnesium binocular is one-quarter the weight and one-third the size of conventional binoculars of comparable optical performance. The housing is a complex part cast by the lost-wax process to achieve accuracy needed for mounting the optical system.—Prod Eng, Ap, 108

CAPACITY NOT PLASTIC

Dependence of one industry on others is well illustrated by limitations in the plastic field—a fact that engineers and management men should watch. The chief engineer of a chemical plant explained recently that if the automotive industry were to use large quantities of molded plastics like those on the Packard rear-seat trim, the demand would equal total present tonnage. Also, the plastic-panel prefabricated house that Chrysler designed and wanted to build would have needed twice the phenolic resins now being produced. Plant capacity for phenols was low, but the real bottleneck was the coal-tar benzine or benzol used as basis for the phenol.—Am Mach, Ap 8, 93



PLASTIC MOLDER—Mass production of injection-molded plastics is possible with this Hydraulic Press Mfg. Co. molder. Handling all thermoplastics, it will take 40 oz. of acetate or 32 oz. of polystyrene per cycle. Operation is entirely automatic, the operator merely removing the part. Four cycles are: (1) Mold is closed and clamped, (2) material fed into two-zone and heated, (3) material injected into closed mold, and (4) after chilling, the molded plastic part is ejected.—Business Wk, Ap 3, 52

LIGHTNING PROTECTION ON POWER CIRCUITS

Developments that have enabled Consolidated Gas Electric Light & Power Co., Baltimore, to improve lightning protection fall into six classes.

1. Use of reduced rating lightning arresters on 13.2-kv. equipment: Arresters rated 15,000 v., phase-to-ground, were replaced by 12,000-v. units.

2. Application of protector tubes for insulator protection on high-voltage feeders and air-break switches on transmission circuits: Tubes on overhead feeders are installed on every pole or on every other pole within ¼ mi. of junction between cable and overhead lines. All air-break switches on 110,000-v. circuits directly exposed to lightning surges are equipped with tubes.

3. Location of protection devices close to equipment: This is especially important on low-voltage and 4,150-v. apparatus.

4. Reduction of ground resistances: Interconnected equipment is tied to driven rods, salted to reduce resistance down to 5 ohms. On transmission circuits, counterpoises or wires buried 12-24 in. are used.

5. Evaluation and coordination of insulation levels: Improvements included use of wood crossarm braces, maintenance of adequate air clearance, and application of instrument transformers having higher impulse levels on overhead feeders than on underground cables.

6. Modernization of protective equipment: Program centered around arresters, tubes, system changes, and use of distribution transformers with coordinated gaps.

Results are indicated by reduction in transformer damage per thousand in service—from 12 before 1936 to about 4 per thousand since 1941.—Elec World, Ap 10, 105

DRAWS HEART'S PICTURE

The electrokymograph, developed jointly by Temple University medical faculty and the U. S. Public Health Service, overcomes limitations of fluoroscopes and gives doctors a record of heart's actions. Used with a standard fluoroscope it has a photocell that intercepts X-rays and a scribing device draws a permanent record of what the cell sees. By moving the cell's position in relation to the heart, the doctor is able to chart behavior of various parts of the heart.—Sci Ill, May, 33

NEW VARIABLE STRIPER PRODUCES KNIT PLAIDS

Complete range of knit-plaid designs are possible with Supreme Knitting Machine Co.'s new Model SA automatic variable striper. It operates with 3-level pattern wheels, produces 8–10 lb. of 4-color variable-striped cloth per hr. Yarn rack and cams are stationary, while cylinder and take-up revolve. There are 32 feeds, 16 of which are stationary. All 32 feeds will take pattern wheels.

Color changes are made by feeding fingers controlled by pins inserted in striping drum. Machine may be set to knit either plain jersey cloth or, with pattern wheels, knit-or-tuck and three-position cloth.

Cylinder is 24 in. in dia. Model had 1,380 needles, is 18 cut, and can be supplied with 64- or 80-end yarn standard motions.—Textile World, Ap, 148

PRESERVES CITRUS JUICES

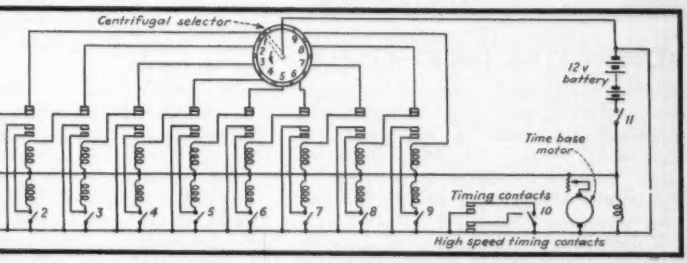
Juice preservation without modification of flavor food value is accomplished in a new and revolutionary Florida plant. The juice is concentrated quickly in an extremely high vacuum, followed by quick-freezing and storage in sealed cans under vacuum at −10° F. until shipped.

The vacuum evaporator has an ingenious ammonia heat-exchange system in which compressed ammonia vapor furnishes vaporization heat. Fresh juice passes through three vertical cylinders of the evaporator, each of which is jacketed with compressed ammonia at 105° F., and is concentrated to approximately 60% solids. During concentration, juice temperature ranges from 50 to 70° F., depending on feeding rate and vacuum.

To concentrated juice is added unconcentrated juice to give a product containing 42% solids. This is cooled to 25° F., slush frozen in a Votator, canned, and quick-frozen at −10° F.—Food Ind, Ap, 78

MORE USES FOR SILICONES

Silicone solution makes a good lubricant for automobile instruments because of uniform viscosity over a wide temperature range. A. C. Spark Plug is now using it. Another new use is for lubricating glass-making machinery where temperatures are high. Silicone is also the friction material between flywheel and case on the new 145-hp. Ford V-8 truck engine, forming a vibration damper.—Am Mach, Ap 8, 93



SPEED-TIME ANALYZER—Because tachometer readings taken in engine tests are laborious and often misleading, C. A. V., Inc., London, developed an analyzer to record and integrate with counters the total time during which an engine runs at various speeds. Data are used in design of auxiliary equipment. Recording unit counters are tied in electrically with a time base motor and a centrifugal selector switch driven by the engine crankshaft. Timing device gives one second impulses, permitting a counter to record in seconds the time the engine runs within a speed range. High-speed drum switch and counter switches are provided for resetting counters.—Prod Eng, Ap, 104

ENLARGED IMAGE — Plastic magnifying screens for television sets, manufactured by the E. L. Cournaud Co., increase the original 52 sq. in. image (above) to 150 sq. in. (below).—Elec Whols, Mr, 108

DETROIT STILL LOOKS AT AL

Pinched by the steel shortage, the entire auto industry is highly interested in aluminum. One series of studies is proceeding on shot peening. Improvement of steel physicals by peening is well established, but use on aluminum is still an unknown quantity.

Kaiser-Frazer Corp., switching to aluminum as fast as it can to protect its steel position, is building dies for die casting doors. Cost of steel and die-cast aluminum doors are about the same, with advantages of weight, fit, and weather sealing accruing to the lighter metal.—Am Mach, Mr 25, 125

AIR-CONDITIONING DUCTS IN OPEN-WEB GIRDERS

Passing air-conditioning ducts through steel roof girders which support the 150-car roof parking lot at Macy's-Jamacia department store has saved headroom. Air-conditioning units are located in both sub-basement and penthouse. Penthouse ducts pass through webs of girders between floor beams, the girders having a Vierendeel appearance.

Typical girder is 74 in. deep and consists of two 18-in. deep T-flanges and two 69x$\frac{3}{8}$-in. web plates. Openings are about 4$\frac{1}{2}$ x 3$\frac{1}{2}$ ft.

A 40-ton plate girder provides a clear, 103-ft. opening at store front. Roof parking lot is reached by two 1-way ramps inside the building. Receiving docks are in the sub-basement, trucks being lowered by elevators. This keeps surrounding streets clear for normal passenger car traffic.—Eng News-Rec, Mr 18, 97

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POLYPHASE FREEZER

Now proved commercially, polyphase immersion freezer has a rectangular reservoir sectioned off by guide vanes. Beneath the reservoir are two refrigeration drums, motor driven and internally refrigerated by direct expansion.

The polyphase medium is a sugar solution or combination of sugars and salt, which fills the system so drums are submerged. Revolving drums slush-freeze the polyphase medium, through which food to be frozen is carried by agitation caused by drum rotation.

Individual pieces of food are quickly frozen, then carried over a vibrating drainage table that removes excess fluid. Freezing rates vary. Many fruits, berries, and vegetables are frozen at -2° F. in 4–7 min., canteloupes and carrots in 10–12 min., and peas and lima beans in 90 sec. Freezing costs are low, quality is good, and defrosting is simplified.—Food Ind, Ap, 100

Convertaplane—A Possibility

Aircraft would combine hovering characteristics of helicopters with high speed of conventional plane. It would have high utility and safety

COMBINING the hovering and slow landing characteristics of a helicopter with the high-speed characteristics of a conventional airplane, the "convertaplane" is gaining increasing interest from engineers. As a passenger plane it would have increased utility and safety over conventional planes.

The National Advisory Committee for Aeronautics is pushing research in "convertaplanes" to determine a necessary combination of features and to analyze research necessary to bring the craft into being. Wind-tunnel tests are being conducted on nearly full-scale models.

Three problems in configuration are paramount: (1) How to start and stop a rotor in flight. (2) How to make rotor efficient as a propeller. (3) What is the best combination of features? Several solutions to the first question have been developed, some having been flight tested. Answer to the second will require extensive research.

The third question appears to fall into the following six categories:

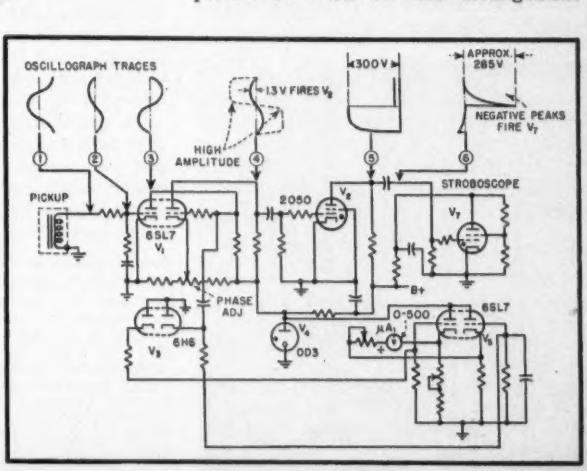
Rotor blades become fixed wing—Conventional helicopter rotor blades are stopped in flight to become conventional fixed wings. Then, when desired, rotor could be released and the craft might hover for landing. This principle has been flight tested.

Rotor blades streamlined—Similar to the category above except that blades are stowed in a lateral position instead of horizontal. When sufficient forward speed is obtained so wings can carry load, rotor shuts off and weathercocks into position. Wing is set at about 6° to the plane of the rotor so wing assumes load.

One form is a single-blade rotor with a streamlined weight at the other end. Weight could be replaced with a small jet engine.

Retractable rotor blades—Some experimental work on this arrangement

ELECTRONIC WHEEL BALANCER—Truck or bus wheels can be balanced by a unit consisting of wheel spinner, magnetic vibration pickup, indicating meter, and stroboscope tube. An 8-tube electronic circuit measures amplitude of unbalanced vibration and governs flashing of the stroboscope tube. Pickup coil has a 2,200-ohm dc. resistance and an output of 2 volts at 1,200 rpm. with an over-all amplitude of 0.025 in. Meter registers unbalance, stroboscope indicates spot for weights. — Electronics, Ap, 134

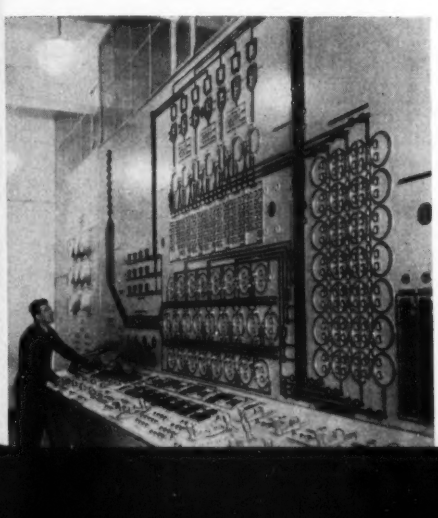


has already been done in England. Fixed wing area and wing surfaces are at a minimum and diameter to rotor is controlled by plane's speed. Rotor tip speed remains constant during conversion.

Rotor, body swing together—This is one of the simplest types. Craft rises vertically to desired altitude, then it rolls over and moves forward with rotor acting as a standard propeller. General Electric Co. conducted research during the war with a 40-ft. wing-span craft with a 35-ft. dia. rotor mounted on its tail. It climbs and hovers at about 100 rpm. and in level flight attains 200 mph.

Rotor pivots in relation to body—With little modification, many current laterally opposed helicopters could be modified for tests. Axis of rotors is rotated 90° enabling the craft to ascend or descend vertically while fuselage remains in normal horizontal position. After desired altitude is reached, rotors are turned forward and they act as conventional propellers.

Rotor blades change axis of rotation—Rotors are operative during climb and hovering action but are slowed to a stop to comprise fixed wings for level flight. This type is adaptable to jet propulsion and shows promise for supersonic guided missiles.—Aviation Wk, Ap 12, 24



DIRECTION FINDER LOCATES STORMS AREAS

A new unit, developed by University of Florida at request of the U. S. Army Signal Corps, is capable of indicating the approach direction of an electrical disturbance at the instant the wave front sweeps past the observation point.

It does this by having two loop antennas placed at right angles to each other oriented east-west and north-south. Incoming pulses are passed through separate amplifiers from loops. Output voltages are applied to vertical and horizontal deflecting plates of a cathode-ray tube, giving a visual indication of the bearing of incoming signal.

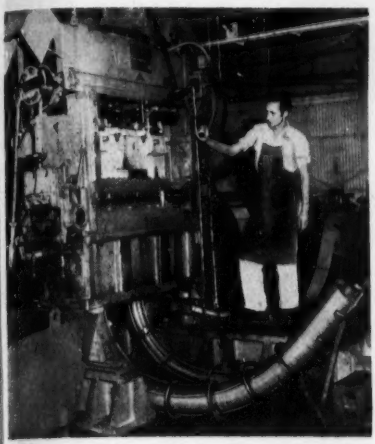
To make storm locating possible, a network of three or four stations with base lines 500-1,000 mi. long is employed. Storm areas are located by triangulation of data from network stations.—Electronics, May, 106

STRIPPER WORKS OLD PITS

Overburden up to 53 ft. deep is being stripped for the same cost as formerly 35-ft. overburdens by Wingert Contracting Co., Inc., through use of larger and more efficient equipment. In stripping, no earth is rehandled. Coal is dug without shooting. Angledozers push dirt into pit from which coal has been loaded.

Core drillings are used to determine overburden and sample coal although the seam is uniform and continuous. As coal is loaded and hauled on seam because bottom under seam is soft.—Coal Age, Ap, 87

CONTROLS GRAIN—Movement of grain in and out of 4-million bu. Australian wheat terminal is controlled by one man operating this huge central switchboard. Signal lights plot movement of the wheat on conveyor belts, while above the board is a layout of entire terminal. By watching signal lights operator knows when grain is correctly routed, when it is ready to be conveyed to weighing tower, and when the weighing is finished.—Food Ind, Ap, 110



High-speed press must be elevated from the floor to accommodate lamination ejection chutes that curve from beneath it

GOOD WORK HANDLING RAISES PRODUCTIVITY

High worker productivity in a stamping shop depends first on dies and next on work-handling means. A. O. Smith Electrical Mfg. Co. solved the problem in stamping electric-motor rotor and stator laminations by special work-ejection chutes into which punchings are forced by punch pressure.

From a 5-stage progressive die on a Bliss 645D high-speed press, 8,000 punchings per hr. are ejected into curved chutes set under the press. Chutes, built of four guide rods spaced apart by retaining rings, are straight at the entry end and then curved so blanks feed up an incline.

Weight of the laminations on the upcurved section effects a back pressure along the blanks. This keeps the chute full and prevents blanks jamming in the chute or cocking in the die and acting as a diaphragm with a backward spring action.

When a different size of lamination is to be run, another chute is used. But the removed chute is never unloaded, as doing so would mean loss of the entire back pressure and trouble in setting up job next time.—Am Mach, Ap 8, 88

ULTRASONICS GUIDE BLIND

Development of the pulsed-frequency-modulation (pfm.) system of blind guidance by ultrasonics promises practical use. Equipment weighing 5½ lb. detects obstacles up to 30 ft. and warns the blind person through a bone-conduction receiver.

Sound from a sawtooth oscillator is radiated through a unit of a double transducer held by hand. The echo from the obstacle is received in the second unit of the transducer. The echo and the original oscillator frequency are combined in a mixer stage, and the audible beat note is fed into a headset.

A single audio frequency corresponds to a given distance, and repetition rate is sufficiently slow that even most distant signals return before the new repetition period begins. Thus, no contradictory information is supplied the blind person because he can learn to identify the different distances.

Blind subjects picked the pfm. system as best of all systems tested for actual outdoor situations. But its eventual usefulness must be evaluated by psychological tests and use to show whether information supplied is valuable enough to outweigh its inconveniences.—Electronics, May, 76

FIG POLLINATION

Experimental work shows possibility of pollinating figs by chemical hormones instead of fig wasps from caprifigs (male fig fruits). Tests indicate that spraying at pollination time with a solution of indolebutyric acid will effect a set of figs. Future work planned includes investigation of other effective materials that may be less expensive.—Food Ind, Ap, W 27

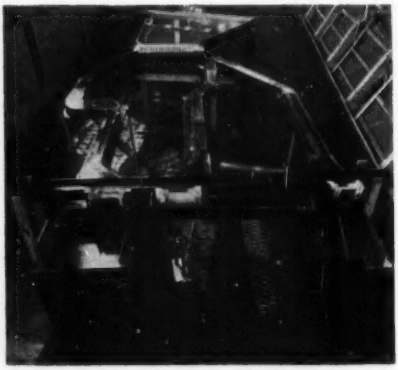
HARD-FACING APPLIED BY AUTOMATIC WELDING HEAD

Baby brother to automatic welding, automatic hard-facing makes use of the same welding head. But its development waited on production of hard-facing wire in coils, now achieved in tubular form on special machines.

Automatic application is readily adapted to any part on which hard-facing may be laid in a series of continuous stringer beads. Advantages over hand hard-facing are many, including higher welding speed, more uniform arc, better surface appearance, and lower cost. Uses are multifold in steel-mill, mine and construction-equipment maintenance and in manufacturing.

Most automatic welding heads will handle the new hard-facing wires. The only trouble encountered so far is in the feed mechanism. As the wire is tubular it deforms under extreme pressure. The feed rolls therefore should be grooved to fit the wire exactly so the feed will be positive and without excessive pressure under all conditions. This assures an even, uninterrupted deposit.

Positioning equipment, fixtures, and jigs for automatic hard-facing can, as a rule, be easily designed and built.—Welding Eng, Ap, 46



AIDS STEAM PLANT DESIGN—Hydraulic model is helping Detroit Edison Co. in reconstruction and extension of an existing steam plant. Problem was to determine whether increased demand of 446 cfs. for condensing cooling water, caused by installation of larger units to increase capacity by 200,000 kw., could be met. The model is scaled ¼ in. to the foot, so velocities vary as the square root of 48 and volume varies as the square root of the fifth power of 48. Model water requirements are maximum plant demand of 750,000 gpm. divided by fifth root of 48 squared, equalling 46⅞ gpm. The model is made of white pine and painted with bitumastic solution.—Elec World, Mr 27, 105

CHECKS FUEL CONSUMPTION

Automobile manufacturers can accurately determine fuel consumption of engines by modified weighing scales. A small fuel tank is placed on the platform. As fuel is used, the platform moves up and auxiliary weights are added automatically to the scale. This achieves indicator travel of about 2 in. per oz. while weighing samples up to 2 lb. A photoelectric attachment picks up less than 0.0001-in. indicator movement, and weighing is extremely accurate.—Electronics, May, 114

PORTABLE MINE PLANT

Nova Scotia Dept. of Mines designed a semi-portable mine plant for examination of old mine workings. Equipment will do repairing, unwatering, and sampling of flooded or abandoned workings, and extending exploration work involving shaft sinking, drifting, crosscutting, or raising. Transportation by one 3-ton dump truck, one ½-ton pickup truck, one 4-wheeled tractor, four 4-wheeled trailers.—Eng & Min J, Ap,

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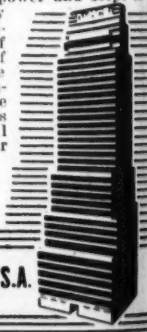

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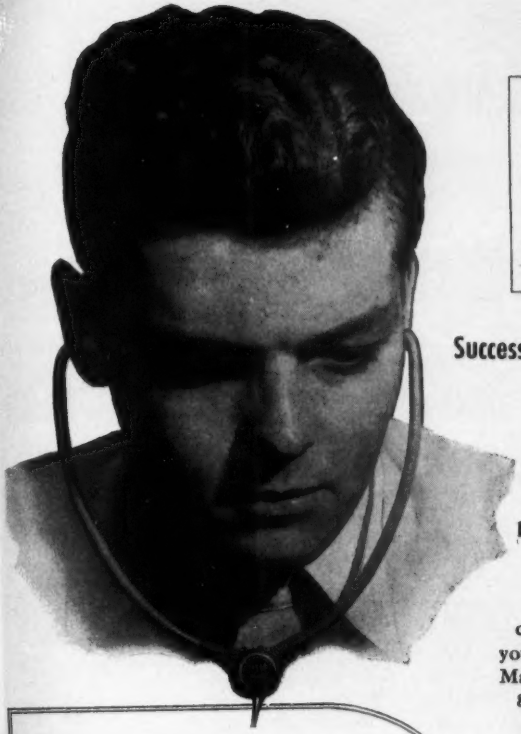

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WESTINGHOUSE NEWS

MEXICO'S NEWEST MASS PRODUCTION INDUSTRY LAUNCHED

As finishing touches were put on the interior of its new plant, Industria Eléctrica de México, S. A. was already well into the production of Watt hour meters. Other lines of electrical equipment from heavy apparatus to household appliances are now in production, with output stepping up from week to week.

Principally owned and controlled by Mexican citizens, the new unit mass production puts Mexico a long step ahead in its industrialization program. Westinghouse supplied Industria Eléctrica de México, S. A. with basic surveys, plant equipment and licenses to use Westinghouse patents and production methods. Both companies will share results of future product research on apparatus and appliances sold by either.

A NEW LIGHT ON STREET LIGHTING

Engineers may now design street lighting systems with fewer lights and poles, using less power but giving greater illumination. The new Westinghouse OV-20 Mercury Vapor Lamps open this new way to lower costs by . . .

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- Industrial Production Equipment, Motors and Controls
- Electric Instruments
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For further information on the products illustrated or listed, contact your local Westinghouse distributor or write Department A-514X, Westinghouse Electric International Company, 40 Wall Street, New York 5, U. S. A.

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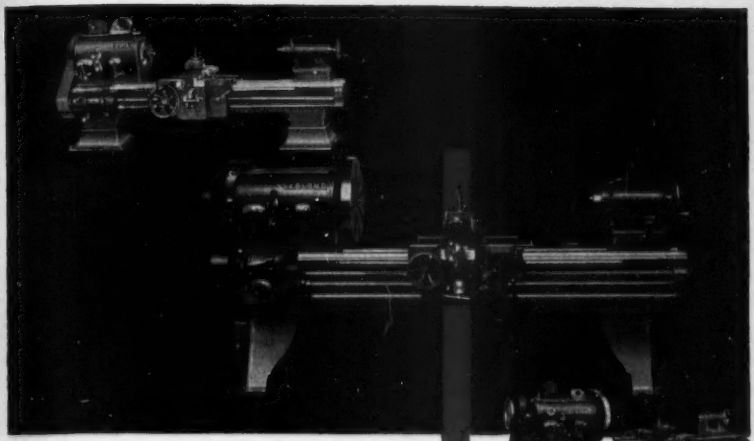

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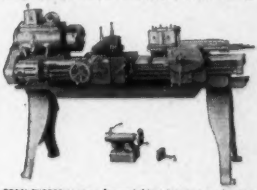

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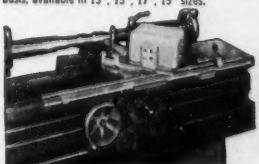

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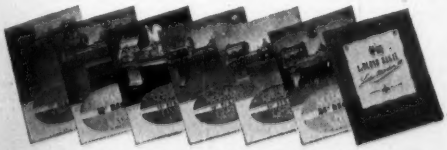

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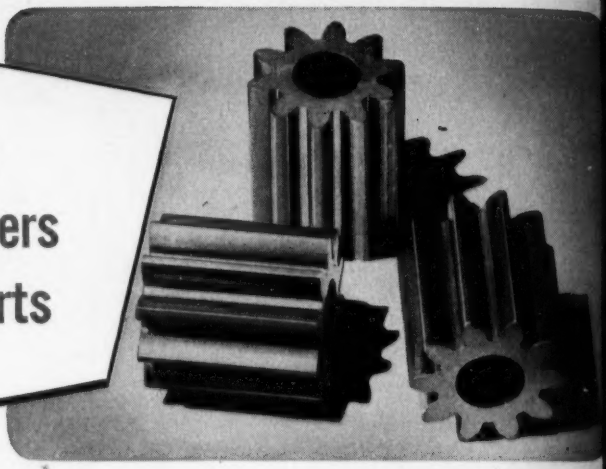

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